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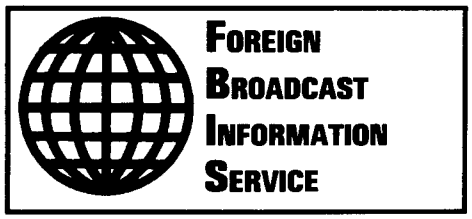

JPRS Report

Science & Technology

USSR: Science & Technology Policy

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Miscellaneous

Paton on Perestroyka in Science

18140236a Kiev PRAVDA UKRAINY in Russian
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[Interview with President of the Ukrainian SSR Academy of Sciences Academician Boris Yevgenyevich Paton by RATAU correspondent D. Kiyanskiy: "Science: Creativity and Dynamism"; date, place, and occasion not given; first paragraph is PRAVDA UKRAINY introduction]

[Text] In order to become an effective tool of restructuring, as was envisaged by the 27th CPSU Congress, science itself should be restructured. President of the Ukrainian SSR Academy of Sciences Academician B.Ye. Paton tells a RATAU correspondent about the elaboration of new approaches to many practical matters of today and the democratization of the life of scientific collectives.

PRAVDA UKRAINY: In the 70 years of existence of the Ukrainian SSR Academy of Sciences, scientists of the republic have made great gains in basic research. However, during the years of stagnation a utilitarian approach became firmly established. They began to demand an immediate return from scientific institutions. And this did much harm. Today it is universally recognized that restructuring in science begins precisely with the development of basic research. But, on the other hand, a rapid return has also not be removed from the agenda. How reasonable is it to combine the two?

B. Ye. Paton: Just recently basic research and the technological application of its results were, if it is possible to put it this way, considerably dispersed in time and space. A kind of bridge, which links scientific theory with practice, is advanced technology. It is possible to cite quite a number of examples of the successful embodiment of the results of basic research. In recent years several hundred technologies of different levels and purposes, which are being used in many sectors of the national economy, have been developed here. In particular, the technologies of the production of new types of large-diameter pipes, which were developed at the Institute of Electric Welding imeni Ye.O. Paton of the Ukrainian SSR Academy of Sciences, as well as an entire range of technological processes of their field welding during the laying of heavy-duty main pipelines are of great importance. The in-depth studies of the physical chemical principles of metallurgical processes, solid-state physics, and fracture mechanics were the theoretical basis of these developments.

The basic research in the area of computational mathematics and theoretical cybernetics, which was performed at the Institute of Cybernetics imeni V.M. Glushkov of the Ukrainian SSR Academy of Sciences, made it possible to formulate the macropipeline principle of the organization of the computing process and to develop the technology of the designing and production of multiprocessor recursive computers that have a superhigh speed.

The technologies of the dynamic hot compacting of high-strength powder items, which were developed at the Institute of Problems of Material Science imeni I.N. Frantsevich of the Ukrainian SSR Academy of Sciences, have acquired extensive fame.

Today it is possible to note the obvious trend toward the convergence of exclusively scientific and applied tasks. It is a question of the appearance of works of a fundamentally new class—goal-oriented basic research, which is succeeding the traditional forms that are characteristic of what is called "pure" science. Without being in the least inferior to it in fundamentality and depth, it is proving to be incomparably more effective. Not by chance did such major problems as thermonuclear fusion, the development of space, and the development of electronic computer technology require from the very start goal-oriented basic research. Its transformation from an isolated phenomenon into a mass phenomenon is now beginning.

If we talk about the other conditions that are conducive to a rapid return, one of the main ones is the mutual interest of science and production in the quickest implementation of developments. The proposals of scientists should be tested, should ensure the optimum technical and economic indicators, and should conform to the highest world achievements. On the other hand, cost accounting and self-financing will force enterprises to update technology and to modernize equipment. And then, as M.S. Gorbachev stressed while visiting the Institute of Problems of Material Science of the Ukrainian SSR Academy of Sciences, it is not scientists who will seek a place for the introduction of developments, but enterprises themselves will begin a counter search. Otherwise they will simply not ensure their economic well-being. Unfortunately, the new economic mechanism has not yet begun to work, as we all are expecting. Today the assets, which have been allocated for the development and introduction of new equipment, are often used for various current matters, material stimulation, and social amenities. But this, of course, is a temporary phenomenon.

PRAVDA UKRAINY: The use in planning of directive principles is promoting to a great decree the increase of the effectiveness of basic research. But you will not include a discovery in the plan. It often occurs not at all where they expect it and in many respects depends on intuition and talent. How is one to reconcile creativity with the "directive"?

B. Ye. Paton: Directive planning, in essence, is a form of the implementation of the state order on the development of science. It makes it possible not to permit such a situation, when individual scientists for many years

develop, in essence, the same theme, while only slightly changing its name. We regard the attempts of institutes to evade the fulfillment of "directive" themes as inertia and the reluctance to reform. Of course, such operations are provided with resources first of all.

At the same time assets for enterprising exploratory research, the themes of which will be formulated by scientific institutions themselves, are now being allocated from the budget. Such research should be conducted for the creation of a leading scientific reserve and the search for "points of growth" and new directions, on which it is subsequently necessary to concentrate the efforts of scientists. Precisely here there is the great likelihood of the appearance of discoveries, the practical use of which at first might also not be visible. Nevertheless, in such cases creativity will be provided with substantial financial backing, assets will not have to be found.

PRAVDA UKRAINY: Interbranch scientific technical complexes and engineering centers are contributing to the significant shortening of the time of the practical implementation of scientific developments and to the development and improvement of equipment and technology. But life is making its own adjustments in them. To what extent does the idea of establishing these subdivisions correspond to its practical embodiment today?

B. Ye. Paton: Interbranch scientific technical complexes are called upon to make vigorous technological breakthroughs in the main directions of scientific and technical progress. In addition to two interbranch scientific technical complexes, the Institut elektrosvarki imeni Ye.O. Patona and Poroshkovaya metallurgiya complexes, of which institutes of the Ukrainian SSR Academy of Sciences are the head organizations, a number of other scientific institutions of the academy are a part of seven other interbranch complexes: Katalizator, Biogen, Membrany, Antikor, Nadezhnost mashin, Mekhanobr, and Termosintez. Unfortunately, interbranch scientific technical complexes, in spite of individual successes, thus far do not have the necessary plenitude of real rights and are reminiscent, figuratively speaking, of "paper tigers." In essence, they are a conglomerate of institutions of different departmental subordination. Here dependence on ministries prevails over enterprises, while the sector first of all looks after its own interests. Another stumbling block is the coordination of developments with series production. Small test batches of equipment, which have already undergone testing, stay at the plant threshold. In principle they do not reject the developments of scientists, but on various pretexts postpone them for an indefinite time: now the enterprise does not have the capacity, now it is busy with current orders. As a result the pace slows, the breakthroughs to tomorrow, for the sake of which interbranch scientific technical complexes, strictly speaking, were established, are put off.

The task of engineering centers is the rapid development, wide-scale introduction, and highly efficient use of the latest intersectorial technologies. Moreover, the advanced training of engineering and technical personnel is carried on their basis. Unfortunately, at the meeting points with production it is also not possible here to avoid skidding. I believe that it will be possible to eliminate many difficulties, when the new economic mechanism begins to operate fully.

PRAVDA UKRAINY: A poorly operating plant can now be declared bankrupt—with all the ensuing consequences. But what if after changing over to cost accounting an institute were to be in the position of a scientific and financial failure? What steps can be taken in this case?

B. Ye. Paton: In principle the same approach should also exist in science. If an institute does not ensure the attainment of leading positions in its field and loses the previously gained levels, then, of course, it is necessary to raise the question of closing it.

PRAVDA UKRAINY: Who will then develop this scientific direction?

B. Ye. Paton: A successfully working collective in another republic.

PRAVDA UKRAINY: The abolition of the financing of the maintenance of scientific organizations and the changeover to the goal-oriented financing of specific programs, themes, and enterprising exploratory research envisage a mandatory competitive basis and the examination of ideas. But how, while preserving the spirit of genuine competitiveness, is one to ensure the complete objectivity of evaluations and their independence of group interests and administrative pressure?

B. Ye. Paton: The lack of healthy rivalry gives rise to apathy and indifference and leads to a decrease of responsibility and, as a result, to scientific parasitism, when a person, who calls himself a scientist, strives merely to snatch a few more benefits, without being embarrassed at all by the fact that his efforts are by no means enriching science.

We will be frank—the competitive principle blended poorly with the atmosphere of bureaucratic administration by mere decree, monopolism, and patronage. Competitions were often so emasculated that they turned into exclusively formal procedures. Only after improving competitive practice will we also be able to really improve the moral and psychological atmosphere at scientific institutions. Only a principled and competent examination can ensure the complete objectivity of evaluations. It sharply reduces the likelihood that assets will be spent in vain.

Such an examination is a most important means in combating libertarian pressure, departmental egotism, and the personal likings and dislikes of managers. And, of course, independent, highly skilled specialists—leading scientists of the republic and country—should make it. Unfortunately, many of them are not displaying the desire to act as experts, since they have had sufficient opportunities to be convinced that their opinions are taken little into account when making decisions. Moreover, purely symbolic payment was made for such labor-consuming and responsible work, which requires vast knowledge and enormous experience, which was by no means conducive to the increase of the scientific level of the examination.

PRAVDA UKRAINY: Thus far monopolism in science has not yet been completely eliminated, the real danger of the dictation of individual schools and directions exists. What is one to do, when such a threat appears?

B. Ye. Paton: In principle it is also possible to request the services of prominent foreign specialists. True, such a possibility so far exists only in theory, while the spending on an examination, which is sanctioned by our financial organs, for the present is very negligible.

PRAVDA UKRAINY: Boris Yevgenyevich, what do you think about scientific pluralism—open debates, the role of which in past years was deliberately belittled? What is their significance for truly scientific creativity?

B. Ye. Paton: Any restriction, and especially the curtailment of debates, should be regarded as an alarming symptom, of which stagnation in the development of research, the loss of leading positions, and the disintegration of scientific schools might be a consequence.

It should be acknowledged that there are still too few debates and too little honest and open exchange of opinions at our institutes. The expression of disagreement and a point of view, which differs from the opinion of management, at times are equivalent to the assignment of an opponent in a scientific dispute to the category of poor workers with all the ensuing consequences and organizational conclusions. The most titled scientist should understand that his authority presumes the ability to defend the truth in an honest scientific dispute. Everything else, with which they attempt to replace this, is equally destructive both for the truth and for authority.

One should speak separately about the standards of debates. There are really few examples of when they develop into a trivial squabble. Under the conditions of restructuring and modernization all kinds of intrigues, power plays, and the belief in one's own exclusiveness and "unsinkability" will only do harm to both the manager and the collective. The suppression of scientific dissent is ruined fates, discoveries that have not occurred, and a lag in a large number of directions behind other countries.

PRAVDA UKRAINY: The success of the restructuring of science in many respects depends on the directors of institutes. Elections are called upon to see to it that not mediocre administrators, but real scientists and recognized leaders of collectives would head them. But today they are, if it can be put this way, multistage. In the final analysis not the collective, but the general assembly of the department, which has the final say, elects the director. Is it possible under the conditions of democratization and the firm establishment in science of a truly creative atmosphere to regard such a situation as normal?

B. Ye. Paton: Changes in the life of institutes and the introduction in the research process of the spirit of controversy and initiative in many respects depend on who heads the institute. And here to our own surprise we were encountered great complications. The "problem of the director" emerged. Many venerable scientists in some cases are not willing and in others are simply afraid to head creative collectives under the new conditions. A shortage of people, who are capable of advancing a constructive program of the scientific collective and assuming responsibility for its fate, appeared. The solution, apparently, consists in the significant increase of the attention to the training of a capable reserve of management personnel and the firm and consistent support of independent, truly enterprising people who long for changes.

Previously the presidium, as a rule, selected the candidates for this position. Now the procedure has become more democratic: the scientific council of the institute, the party committee, the trade union committee, the Komsomol committee, the departments of the institute, and other scientific institutions have the right to nominate candidates. Accordingly there can also be several candidates. And whereas previously the candidate for director was proposed to the general assembly of the department without preliminary and open discussion, now all the candidates are considered without fail at the general assembly of the scientists of the institute, which by a secret ballot specifies its attitude toward each candidate. Thus, the assembly of the department elects the director, taking into account the opinion of the collective.

Perhaps, this procedure is insufficiently perfect. After all, the collective for the present has only a deliberative voice. However, the statute that regulates the election procedure is by no means a dogma. Life is continuing. And it is making it incumbent to make adjustments and to seek new forms. All of us today are learning democracy.

Official Calls for RSFSR Academy of Sciences

18140236b Moscow SELSKAYA ZHIZN in Russian 22 Mar 89 p 2

[Article by E. Andriankin, director of the Theoretical Problems Department of the USSR Academy of Sciences, under the rubric "A Solution Is Required": "An RSFSR Center of Science Is Needed"]

[Text] Academician Mikhail Alekseyevich Lavrentyev, founder of the Siberian Department of the USSR Academy of Sciences, repeatedly spoke about the fact that in

the RSFSR [Russian Soviet Federated Socialists Republic] it is necessary to have a republic academy of sciences. The first regional department of the USSR Academy of Sciences, which was established by him in the 1950's, long ago displayed its great effectiveness and has provided a fine pleiad of Soviet scientists. After the Siberian Department the Ural and Far Eastern departments and the Northwestern and Dagestan scientific centers were formed following its pattern on the territory of the Russian Federation.

Regional departments were also formed in union republics—in the Ukraine and Belorussia. They are necessary. First of all because the basic research of scientific collectives is inseparably connected with the needs of the regions of the country and is conducted jointly at institutes which, although of different types, still are united in a single department. Moreover, within the departments basic science is linked more closely with the accomplishment of local practical tasks.

In this light the fact that on the enormous territory of the center of the RSFSR the development of basic research has obviously been ignored by academic science, is attracting particular attention. Academician A.A. Dorodnitsyn, director of the Computer Center of the USSR Academy of Sciences, notes that 72.5 percent of all the academicians and corresponding members of the USSR Academy of Sciences live in Moscow and Leningrad. While in other cities of this region there are practically no scientists. This is having an adverse effect on the development of the central region of the RSFSR, since science-intensive works and their highly skilled personnel in various cities of the center of the RSFSR—Tula, Ryazan, Voronezh, Smolensk, Ivanovo, Kursk, Lipetsk, and others—were cut off from basic science.

The fact that the absence of prominent scientists in the cities of the Central RSFSR is impoverishing this enormous region, depriving it precisely of those "plenipotentiaries of science," who could report in a most prompt and authoritative manner to the highest leadership information on the needs of the region, and is complicating the increase of local talented people, who are so necessary for the development and preservation of the distinctive science and culture of the RSFSR, is also negative.

The Theoretical Problems Department of the USSR Academy of Sciences proposed 2 years ago to establish in the center of the RSFSR the regional RSFSR Department of the USSR Academy of Sciences, which would be a forerunner of the RSFSR Academy of Sciences. The time has come to direct the closest attention to its formation. It is called upon to complete the unified chain of regional departments on the territory of the RSFSR. In this matter we are very late as it is. What is to be done? It has already become the custom to solve the vital problems of the RSFSR not first of all. Our state is large, and much energy has been and is being spent on the development of outlying areas, republics, and okrugs. This is as it is in a large family: parents should take care of their children. Now academic institutions have been established everywhere, except for the center of the RSFSR. But it is more difficult to turn with a proposal or for advice from an out of the way place of the RSFSR to Moscow or Leningrad than to fly there from Sverdlovsk or Novosibirsk. The statistics are such that there are approximately one-fifth as many academicians per 100,000 inhabitants even for the entire RSFSR as there are for the union republics (of course, with allowance made for republic academicians) and one-half as many scientific institutions.

The development of the basic sciences is always inseparable from the development of the culture of the people. How is it possible in such a case to deprive the central oblasts of the RSFSR of this connection? After all, at one time this region was a source of culture and science for all of the RSFSR. Manpower resources for the development of outlying areas were also "scooped" from it. Now the budget of the 29 united institutes of the RSFSR Ministry of Higher and Secondary Specialized Education is less than half as much as that of the 34 institutes of Siberia. It is not surprising that the most important problems of the development of the agroindustrial complex of the Nonchernozem Zone for a long time have remained unsolved. And among them are the questions of the increase of soil fertility, the efficient management of farming, the location of nuclear power plants, the use of timber resources, the construction of reservoirs and other water reclamation structures, the overcoming of the low birth rate, and the development of the economic bases of the economy and the entire social sphere and culture of the region.

The establishment of the RSFSR Department of the USSR Academy of Sciences with a base in one of the cities of the Central RSFSR, and then of the RSFSR Academy of Sciences in Leningrad could help to resolve the formed situation. In the activity of the department the traditions that are characteristic of RSFSR science—such as humanism, national character, the magnitude of problems, the combination of basic research with inventive activity—should undergo development and the current trends of the convergence of research in various fields of knowledge, first of all on the basis of computerization and the extensive use of the methods of applied mathematics, should be taken into account.

It is possible to charge the RSFSR Department with the elaboration of a number of ecological, economic, and sociological problems of the region, including the question "of the increase and development of the Russian people," which was posed by M.V. Lomonosov. This will contribute to the growth of the culture and material resources of the central region of the RSFSR, which, in turn, will make it possible to achieve a breakthrough in the priority areas of science and science-intensive technologies.

The establishment of new institutes in the capital is not required for the formation of the RSFSR Department, it is sufficient to transfer to it several institutes and laboratories, having charged them with the organization of

affiliates in cities of the Central RSFSR. And in general it is better here for the institutes to be small, then to unite creative scientists with an inventive flair, which is so characteristic of the Russian people. In those cities, where for the present there are few talented scientists, it is necessary to establish laboratories with a separate status and not to artificially inflate the staffs for the increase of the prestige of the directors. It is also possible to transfer to the RSFSR Department small, but promising divisions of sectorial scientific laboratories, while having retained them in the system of interbranch complexes or even having simply established for them scientific methods supervision on the part of the academy.

In academic surroundings there still exists the opinion that it is necessary to develop research where there are many scientific institutions. But science first of all is needed where there are science-intensive works and it is necessary to use better the available workers. In the cities and villages of the RSFSR there are many of them, quite a number of talented people, who due to the lack of scientific laboratories cannot fully reveal their creative potentials, also have still remained. The financing of this department could be coordinated by the RSFSR Council of Ministers on the basis of the principles of cost recovery and could be combined with the extensive development of cost accounting operations.

It is also necessary to envisage special-purpose vacancies of corresponding members and academicians with their departure for cities of the Central RSFSR, as was done for the development of science in Siberia, the Urals, and the Far East. It is necessary already now to establish a working group at the USSR Academy of Sciences, which also includes representatives of interested ministries, and to commission it to carry out all the preliminary measures. The potential references to the lack of vacancies of corresponding members and academicians for the RSFSR Department are not convincing. I am certain that even at the academies of the union republics they could allocate for this department one or two vacancies each.

The RSFSR Department can become a "proving ground" also for testing new scientific organizational forms, which are based on the development of the democratic principles of management, with the appointment by election of all executives, including directors, at the assemblies of the labor collectives of the institutes, with the changeover of scientific organizations to full self-management. The department, undoubtedly, will increase the prestige of Soviet science, which in recent years has decreased appreciably.

The formation of the RSFSR Department as a forerunner of the RSFSR Academy of Sciences will be one of the necessary steps, inasmuch as the state of the central region requires the immediate taking of comprehensive steps on the increase of the level of research, the broadening of its scale, and the development of culture. Already now it would also be possible on the basis of the Leningrad Center of the USSR Academy of Sciences to begin the organization of the RSFSR Academy of Sciences, having charged it with the establishment of the new regional department in the center of the RSFSR.

Cardiological Research Institute Contracts With Medical Cooperative

18140197 Riga SOVETSKAYA MOLODEZH in Russian 2 Feb 89 pp 1, 3

[Interview with Prof. N. A. Andreyev, director, Latvian Cardiology Research Institute by G. Novikov, date and place not given, under the rubric "Timely Interview": "Scientific Cooperative. What For and Why?" First paragraph is SOVETSKAYA MOLODEZH introduction]

[Text] The Latvians Scientific Research Institute for Cardiology is well known for several non-traditional and effective solutions to timely problems of medical science. Our correspondent met with the Institute's director, Latvian SSR State Prize Winner, Prof. N. A. Andreyev

SOVETSKAYA MOLODEZH: Nikolay Andreyevich, the "Kardiologiya" medical science cooperative was recently founded at your institute. What can it contribute to science, health care, and practical medicine?

N. A. Andreyev: I must admit that I didn't join the cooperative. However, I supported the young scientists' initiative. Nevertheless, I still don't share the opinion of adherents who believe that the cooperative in its current form can solve all the fundamental problems of cardiological care. Twenty doctors working evenings and Saturdays will be able to consult and care for only 30,000-40,000 people a year. That's not many. But what's important is that "Kardiologiya" is a medical science co-op. This means that our co-op members will be able to test new diagnostic treatment methods as they examine a patient, and that the results of their studies and research will be generalized and published in scientific publications. It is particularly important that the "Kardiologiya" cooperative is the model for science's new organization and its financing.

SOVETSKAYA MOLODEZH: How much will an examination at the cooperative cost?

N. A. Andreyev: First, for the majority, examination and treatment (if necessary) will be free. The fact is that the cooperative's charter provides work under contact with enterprises, companies, kolkhozes, and other cooperatives. The amount of income from contracts will depend on the results of the work. Let's say, for example, that the co-op signs a contract with a partner plant; during the year it examines 4,000 workers and their working and living conditions. A quarterly payment of about 30 percent of the total contractual amount over the course of the year is stipulated. During the next year, a record is kept of the decline in losses of fitness for work. If this decline matches the figures, then payment continues—in proportion to the change in this basic efficiency indicator.

SOVETSKAYA MOLODEZH: Are consultations with citizens who don't work at the partner plant excluded? For individual payment?

N. A. Andreyev: This is provided for. Members of the co-op intend to go to clinics to find patients whose examination and treatment may match with the institute's scientific specialization. The examination will be the same as that for the patient from the partner plant: self-interview using a personal computer, as a result of which the predisposition to ailments will be revealed (if there is one), and recommendations made on the use of special diagnostic methods. The computer will also predict a program of effective treatment (if necessary). Data from the computer and examination by instrument will go to the doctor, who works with the patient for 30-40 minutes. If the doctor is convinced that the examination is adequate and the patient is entirely satisfied with the doctor's conclusion, his advice, and treatment program, then the patient has the right to pay, let's say, 10 rubles for the work. It is not forbidden to pay more or less if someone wants. The computer takes into account which of the doctors has brought more patients "to satisfactory condition." That is, it takes into account, although indirectly, not only the number of patients seen, but also the quality of the doctor's work as a specialist and his sincerity, and ability to communicate with patients.

SOVETSKAYA MOLODEZH: But aren't you afraid that the cooperative could go broke with this work model?

N. A. Andreyev: Success in work must be ensured, first, by a guarantee of highly skilled doctors: only candidates in science and first- and higher-category doctors with at least 10 years' experience; second, by a high procedural level: computers, modern equipment (acquired with the cooperative's money), the newest methods of non-medicinal treatment (particularly those developed at the institute), highly efficacious medicines (including those created together with the Institute of Organic Synthesis of the Academy of Sciences of the Latvian SSR).

SOVETSKAYA MOLODEZH: But couldn't one of the patients simply leave without paying?

N. A. Andreyev: If a person is not insulted by mistrust, one can usually trust him. If one out of a hundred turns out to be so dishonest, the cooperative won't be that much the poorer: Its main income will come from contracts.

SOVETSKAYA MOLODEZH: Can you name the enterprises that have already expressed the desire to sign contracts?

N. A. Andreyev: Yes, representatives of RAF [Riga Bus Plant], the Latvian Shipping Company, and the "Adazhi" agricultural company have shown an interest.

SOVETSKAYA MOLODEZH: You assume that this cooperative model for financing science will be able to replace the budget model entirely? But what about basic research and contract research?

N. A. Andreyev: Approval of the cooperative model is a critical creative task. It is entirely possible that other different ways to switch to ?? will arise. Which is not bad: The more diversity, the more opportunities for growth. Now, about contract research. You might probably imagine that a cooperative scientific institution wouldn't sign a contract with a kolkoz, but with, let's say, a ministry or even with the State Committee on Science and Technology. This would be a one-of-a-kind order. The State Committee could propose the topic and even hold a competition among cooperatives seeking the order. Independent experts would determine whom would be given preference. These models for the organization of and orders for basic and applied research are used in many foreign countries. Even here expert councils have been established in all medical specializations under the USSR Academy of Medical Sciences. This is a major step forward: not a contest of people, but a contest of ideas!

SOVETSKAYA MOLODEZH: And how do these councils evaluate the ideas the Latvian Scientific Research Institute for Cardiology is to develop?

N. A. Andreyev: We can't complain. Expert evaluation is based on a five-point system. All 12 of our subject areas submitted for examination were deemed priorities and received (in secret voting) at least a 4. And this when the subjects of other institutes, including those in Moscow, were deemed unsubstantiated. Admittedly, the decisions of these expert councils, the highest for USSR medical science, have still not quite been reflected in the amount and level of financing. Our institute was and still is on a budget of the very lowest, third, category. However, one must give them their due: The expert commission under the Latvian Health Ministry has performed more quickly and efficiently: It ordered two new topics for our institute and immediately issued the funds to complete these orders. This is already a real step toward the switch from financing institutions to paying for work on specific subjects which have been ordered. Admittedly, if you will, toward "prepayment," not payment for the results.

SOVETSKAYA MOLODEZH: But are there any general criteria for evaluating the results of basic research? And does it make sense to do basic work when there are so many unsolved applied, practical problems?

N. A. Andreyev: The rough criteria for evaluating the results of basic scientific work in medicine can be the same as those already used by those USSR Academy of Medical Sciences expert councils when they evaluate the priorities of topics. Only there it's the evaluation of an order, while here it's the evaluation of the result. Now, about basic and applied research. You know, Louis Pasteur always fulfilled a specific public order from winemakers, beer-brewers, etc. in his work. However these applied developments invariably ended with basic discoveries, new theories, which gave a literally revolutionary impetus for practice. So, "the most practical thing is a good theory" developed on the basis of the direct or indirect demands of practice. I can also cite an example from the subject area of our cardiology institute. Let's take one of our subjects, received in 1988 as an assignment from USSR State Committee on Science and Technology. It calls first for research on the mechanisms of vascular tonus using methods previously developed at our institute (we have a whole block of inventions on this); second, the creation of equipment to diagnose disturbances in vascular tonus in hypertension; third, to study the possibility of using new medicines developed together with the Latvian USSR Academy of Sciences' Institute of Organic Synthesis. As you see, both the completion of the development of a theory, and its release into the practice of aiding the ill have been foreseen for 3-5 years already.

SOVETSKAYA MOLODEZH: But some believe that a branch institute can exist working only on practical matters.

N. A. Andreyev: Perhaps, but its work won't be efficient enough. If you permit, I'll cite one more simplified example. Let's assume that we have two completely identical trucks before us. But one has a full tank of fuel (both fundamental and applied), while the other has only half a tank. For a certain time the trucks can travel at the same speed. But the driver with the half tank will drive nervously, looking around for a place to fill up ("filling up" is assimilating outside scientific advances). And if there is no fuel at the pump, "sit down and cry," and maybe somebody will toss you something from abroad!

SOVETSKAYA MOLODEZH: But you can't deny that assimilating foreign experience is useful?

N. A. Andreyev: Not only useful, but necessary. But not in the form of finished "fuel," but in the form of advanced technology for producing it in basic research. And I must say with bitterness that the underdevelopment of information and technological aids is a basic tragedy for our science. There must be more, many times more, contacts with foreign scientists and institutes! I have been fortunate to visit more than 20 foreign countries on trips to congresses and symposia. And every trips is a powerful shock in terms of information. Our institute now has a unique data bank: a computer which stores information on all inventions and discoveries in cardiology for the past 17 years. You know how this keeps us from "reinventing the wheel"? I pressed a few buttons, and on the display screen (we have these "smart terminals" in every institute laboratory) appears everything known about a specific scientific question in the USA, in Japan. Only it's a pity that our data bank is still isolated. It's about time to hook up directly to international scientific information systems or at least to the Latvian SSR Academy of Sciences' computer center.

What's preventing this? Lack of technical capabilities: cable nets, communications equipment. By the way, the only efficient scientific research equipment in our medicine is still foreign. We weren't so badly equipped 10 years ago, when the institute was founded. But everything is wearing out and becoming obsolete. The hope now is that the cooperative will be able to earn foreign currency to acquire equipment. Including new personal computers and computerized diagnostic instruments. This is also required to support basic scientific research and for extensive practice.

SOVETSKAYA MOLODEZH: By the way, how do you explain the current gap between scientific developments and their introduction into practical medicine?

N. A. Andreyev: There are many reasons. One of them, if you will, lies in the very concept of "introduction." It has a sort of nuance of aggression, force: Someone resists, and someone tries to introduce...The problem, of course, is not the term, but the essence. Essentially only sick people have a direct interest in the updating of medical technology. The medical scientist who has completed the development of, let's say, a new method, is not in a position to take it even to the drawing stage, not to mention commercial production of a new instrument. He gets paid not for finished instruments, but for newer and newer research, for completion of new orders. The medical scientists is more interested in finding and doing newer and newer things. That's why he's a scientist! The country has already established several intermediate medical technical cooperative companies—"Praktika," "Vnedreniye," etc. Some institutes of the Latvian SSR Academy of Sciences have also created cooperative SKIBs [special design and research offices]. We assume that as the "Kardiologiya" cooperative grows, it may also create a medical technology scientific-practical subdivision. It's also possible that it will be more advantageous for our cooperative to take advantage of the help of Latvian SSR Academy of Sciences SKIBs or other middle-man cooperatives.

Another aspect of the problem remains unsolved: How to interest practitioners in updating diagnostic and treatment technology. We have enough old working procedures. And no one pays for updating. Only "unnecessary worry." We submit: If our cooperative model, with payment only for final results, justifies itself, then it can be adapted to the work, let's say, of clinic doctors. Then doctors will simply have to assimilate all innovations in order to bring more "patients" to the "satisfied" state. Otherwise, they will go broke, they won't survive the competition.

SOVETSKAYA MOLODEZH: Wait a minute, do you think that all medicine should be for pay?

N. A. Andreyev: Let's be honest: It's already indirectly for pay. The aid patients get "free" through doctors is paid for, I think, from payments to the budget in the form of state employment insurance, the tax on small families, profit from citizens' work at enterprises, the difference between wholesale and retail prices, etc. The Latvian SSR Ministry of Health and the Latvian Doctors' Society are now studying a model for paying for medical care to a specific patient through a system of "hospital" or "insurance" funds. This is already a help. There is also the task of significantly increasing personal interest, including material incentives by enterprises to those who systematically improve their health and don't get sick. So the "threat of citizens' ruin by doctors," can be completely prevented. Another matter is that the payment for a doctor's labor should not be equal, undifferentiated, depending only on seniority and position: The one who gets better results should get more, while the one who isn't interested in what's new, the incompetent and rude—let him go bankrupt! In this system, we hope, both doctors and head doctors will be interested in "introducing" new diagnostic and forecasting methods developed at our institute, including computer programs.

SOVETSKAYA MOLODEZH: And what area of work (scientific, cooperative) can, do you think, help reduce cardiovascular sickness and mortality?

N. A. Andreyev: I have a great deal of respect and a high opinion of the work of "repair shops": surgeons, therapists (I'm a therapist myself), other clinicians. However, I think that the basic efforts of doctors and the entire society should be concentrated on the "boutiques" of all diseases: the environment and way of life. I think that it's time to create serious "ecological medicine" (perhaps even subdivisions—"ecological pneumology, "ecological cardiology"). Probably it is possible to combine the creation of scientific practical institutions on a practical basis and re-orient budget-support institutes and laboratories. Quantitative monitoring of ecological factors with the correlation of computer data is necessary, absolutely necessary. The development of specific criteria and methods for evaluating individual sensitivity, reactivity, each person's adaptability to each of the factors and their totality is necessary. Specific criteria for permissible "pollution" of the emotional and psychological stat of society is necessary. Scientific evaluation and development of specific measures for preventive adjustment of the human gene pool, which is constantly being "contaminated" by alcohol, smoking, drug use, and other perversions. All the people's material and spiritual strengths must be mobilized so that the principles of the transition of the biosphere to the noosphere discovered by V. I. Vernadskiy can be applied to the task.

For perestroyka, for progress, for health, each person must return to what is most important in order to be Rational Man: Humanity, Sensitivity, and Honesty!

Obstacles in Scientific Education Process Described

18140222 Yerevan KOMMUNIST in Russian
20 Mar 89 p 2

[Article by G. Sarmakeshyan under the rubric "What Is Hindering Restructuring": "Why Has the Graduate Student Aged?" Passages in boldface as published]

[Text] The youngest Nobel Prize winner in the history of mankind was 25-year-old F. Crick, who jointly with J. Watson discovered the structure of DNA. Thus began a new stage in the development of biology, which promises mankind enormous prospects. It is also possible to cite a large number of other examples—of scientists and researchers, when outstanding results were obtained early, according to our notions, too early. What is this? Is outstanding talent the happy fate of a few? This is also unquestionable. But still, first of all there are the high-quality training of personnel, a strong scientific school, and the perfect organization of the entire system of scientific research, which is aimed at the maximum effectiveness.

Stay, Fleeting Moment!

If one were to describe in most general outline the age situation in domestic science, this is prolonged infancy and honorable old age, which has been obtained by titanic efforts. Only theoretical physicists, perhaps, constitute an exception. The defense of a candidate dissertation at the age of 40 still does not shock anyone, but a doctor of sciences at the age of 35 remains an inexplicable phenomenon, because early success comes not in accordance with, but, rather, contrary to the entire system of the organization of scientific research, which exists today. Why in the reflections on the problems of the training of scientific personnel did we dispense with the age factor? For in the end the obtaining of a scientific result, and not the age of the researcher, is the only competent criterion. Hence, is it possible to ignore it? But such is only a superficial impression. However much we say about great creative activity in mature years, reality proves otherwise. The optimum age for active research work is the first 10-15 years after graduating from a higher educational institution. Such a limited age framework is due to specific factors—psychological, physical (for research work requires enormous efforts), and, what is especially important, information. In the enormous flow of world scientific information many directions and ideas quickly become obsolete and lose their topicality, while continuous education still remains a matter of the future. The majority of specialists, regardless of academic degree and title, several years after the halt of studies and active research work are simply incapable of working on the front line of science. The creation of the most favorable conditions for fruitful research work precisely at a young age is a colossal but, alas, minimally usable reserve of the increase of the scientific return.

The Crisis of the Genre

The problems, it would seem, lie in this, for precisely VUZ [Higher Educational Institution] graduate studies, to which the most gifted young people ideally come, is the basis unit of the training of scientific personnel. However, only 12 percent of the graduate students succeed in defending their candidate dissertation on time. While during the last 6 years in our republic only 7 of the 118 graduate students in the social sciences defended their dissertation in good time. One of the causes of the low effectiveness of VUZ graduate studies is the poor organization of the educational processes.

The requirements in case of the acceptance of "minimum qualifications" in reality presumed a very limited amount of knowledge and could not support the broad invariant part of vocational training. The indefinite status of graduate studies, to which to this day the position of a poor relative attached to a faculty has been given, which, under the conditions of a general weak material and technical base of higher educational institutions, puts them in a most deplorable state, is also complicating the educational research process.

Indeed, it is possible to name as an anomaly of domestic science its artificial division into VUZ, academic, and sectorial science. Hence, too, the unfavorable asymmetries. Higher educational institutions and academic institutes, as a rule, are strong in their scientific potential, which cannot be fully realized due to the poorness of the material and technical base; sectorial science, while having considerable material possibilities, is scientifically weak. Such a situation is in no way consistent with the common tasks of science—the increase of the intellectual level of science and the establishment of a modern scientific industrial complex.

The time of instruction in graduate studies also needs revision. The alarming statistic of the meager number of graduate students, who defended their dissertation on time, is evidence of the unreality of the time that is allotted for the preparation of a dissertation. On this level the extensive use of such a form of postgraduate work as research trainees, which is being used extensively at higher educational institutions of Moscow, Leningrad, and Kiev and is yielding a significantly higher percentage of graduate students, who have defended dissertations, seems promising. In 2 years of work the research trainee can not only take the candidate examinations and determine more clearly his creative potentials, but also prepare a reserve of scientific work and can devote the next 3 years in graduate studies entirely to the preparation of a dissertation. Unfortunately, this form of work has not yet become widespread at higher educational institutions of Armenia.

The necessity of the presentation by the dissertation writer of the certificate on the introduction of the development is creating a large number of unjustified difficulties when defending a candidate dissertation in

technical specialties. Moreover, under the conditions of the changeover to cost accounting, when enterprises will operate within a strict economic framework, the necessity of new expenditures will come up against greater and greater resistance. Thus, the graduate student himself remains the only interested person and the fate of the development depends not so much on its objective value as on the go-getting abilities and business contacts of the dissertation writer.

Who Is to Teach the Scientist

The scientific supervisor in many respects determines the success of the work of the graduate student. His role is prestigious and responsible, but far from everyone copes with this function, the number of scientists, who formally have the right to supervise scientific work, significantly surpasses the number of actually fit ones. Moreover, however paradoxical it is, candidates of sciences in the majority of cases produce better results than doctors of sciences. The explanation is simple. For many, many scientists the obtaining of a doctoral degree becomes the honorable completion of scientific work, which, in addition, often coincides with the age decline of creative activity. But only by performing research work and being well versed in the most important achievements in a given field is it possible to retain one's scientific potential, which is a necessary demand on a supervisor. The majority of doctors of sciences and instructors of higher educational institutions proved long ago to be detached from the scientific process and production, which in practice reduces to nought their possibilities as a supervisor. Moreover, the secret status of professorial and especially academic "immunity," which exists to this day, is more conducive to honorable rest than to active work. The successes and failures of a graduate student simply do not determine either the status or the pay of a supervisor. Here the faulty principle of leveling is still in force. This, in turn, often gives rise to excessive liberalism toward graduate students and at times also to an openly irresponsible attitude toward the duties of a supervisor.

What is the way out of the formed situation? First of all, **not to regard the higher educational institution as some institution, where on the strength of former services people, who have exhausted their scientific potential, can quietly rest on their laurels.** This is unacceptable and intolerable from both a moral and a civic standpoint. For this erroneously understood tact and equability we are paying with thousands of nonexistent scientific biographies and discoveries, with the lag of the scientific industrial complex, and with enormous material losses.

Another necessary step is the rotation of instructors, which is extremely important in technical specialties. This form is being used widely in developed countries and is yielding an enormous scientific and production impact. A scientist, who has worked 3 years at a higher educational institutions, is assigned for 1-2 years to production, where he familiarizes himself in earnest with its vital needs and advanced technologies. At the same time the reverse process also occurs, which ensures a high level of both science and production.

Problems Remain

The low effectiveness of traditional graduate studies, as well as the new tasks, which have been posed by the restructuring of the entire scientific industrial complex, have changed the goals of graduate studies. Henceforth its task is not the defense of a dissertation as such, but the training of a highly skilled broad researcher and specialist. In technical specialties this is an engineer with broad engineering, economic, and legal erudition and a researcher, who is capable of developing new equipment and technology. The defense of a dissertation remains a desirable, but not a mandatory result of training in graduate studies and should not be confined without fail to the shortest possible time. This automatically changes the status of graduate studies, which should now be regarded as a new higher level of instruction within the higher educational institution. Thus, have the listed problems perhaps lost their urgency? No. Moreover, they may become even more urgent. For now the only formal indicator of successful training in graduate studies, as the defense of a dissertation was, has receded into the past. Will not graduate studies, given all the existing imperfection of the educational process, in addition become altogether uncontrolled? It is necessary to think seriously about the elaboration of precise criteria of the evaluation of the skills of the graduates of graduate studies and to strictly adhere to them, in order not to turn this most important stage of training into just another expensive formality. Today grounds for uneasiness already exist. Thus far graduate studies of the republic do not have the corresponding special courses and programs for the new tasks of training.

And there is another thing of no small importance. Now people often speak about the decline of the prestige of science and the sharp decrease of the number of people who want to devote themselves to research work. Competitive selection for graduate studies is practically absent, which forces one to tolerate mediocrity. It is necessary to solve this problem and to solve it without delay, but from an entirely new standpoint, by completely renouncing the very attractive, but actually untenable idea that enthusiasm is the only stimulus for scientific research work. The literary and cinematic image of the scientist—an impetuous romantic who is alien to all the most elementary human needs, comfort, and everyday orderliness—has become hopelessly obsolete. **One must not place the emphasis on enthusiasm alone, it always was and will remain the moral privilege of only a few.** The labor of a scientist—hard, intense, responsible labor—should, accordingly, be rewarded materially and with social advantages.

More Cooperation Needed Between Academies, VUZ's

18140242 Moscow IZVESTIYA in Russian
9 May 89 p 2

[Interview with Aleksey Stanislavovich Yeliseyev, rector of the Moscow Higher Technical School imeni Bauman, by IZVESTIYA science commentator B. Konovalov: "Instruction Is Inseparable From Science. Interview With A. Yeliseyev, Rector of the Moscow Higher Technical School imeni Bauman"; date, place, and occasion not given]

[Text]

IZVESTIYA: Aleksey Stanislavovich, in the yearbooks of the USSR State Committee for Statistics the number of science teachers of Soviet higher educational institutions for some reason is not cited by a separate line. But if you use the data of the USSR State Committee for Statistics and an arithmetic operation, which is easily understood by a first grade pupil, it is possible from the total number of 1,518,000 scientific associates, which we had in 1987, to subtract the 146,000 scientists of the academic type and the 662,000 of the sectorial type and a fantastic figure will be obtained—710,000! These science teachers of higher educational institutions, according to statistics keeping, are included among USSR scientists as full-fledged scientists. But, unfortunately, the effectiveness of VUZ [Higher Educational Institution] science as compared with academic and sectorial science, to put it mildly, is low. Is it possible given such a state of affairs to train full-fledged creative engineers?

A. S. Yeliseyev: Indeed, it is possible to train highly skilled engineers only on the basis of advanced scientific and technical developments. Unfortunately, the majority of those, who make up "the army of VUZ science," are devoting their basic efforts to work in lecture halls. Their teaching load is so great that scientific and engineering activity is being relegated to the background. As to permanent scientific associates, they are distributed in small groups among chairs and by virtue of this cannot undertake major developments. Moreover, an obviously secondary role in the educational process is assigned to them by the existing rules, and for this reason they do not have a substantial influence on the formation of undergraduates.

In my opinion, in our country the organization of work at technical higher educational institutions is upside down. At foreign higher educational institutions the basic unit, as a rule, is the scientific laboratory. In it basic research is conducted and advanced designing is performed. The participants in this work also become the main teachers of undergraduates. They bring the latest information to lecture halls. There the instructor and the scientific associate are the same person. They do not have to resort to any "tricks" of the intrasectorial combining of jobs. The majority of scientists devote three-fourths of the time to scientific and engineering activity and one-fourth to educational activity. Given such an approach the effectiveness of both scientific and educational work turns out to be high.

In our country the priorities have been arranged differently. We are devoting much attention to the methods of instruction and are obviously insufficiently concerned about conveying to undergraduates advanced scientific and engineering knowledge.

IZVESTIYA: Do you believe that it is necessary to intensify the integration of VUZ and academic science? For in many developed countries, for example, in the United States, there is no such division.

A. S. Yeliseyev: I do not know whether the Academy of Sciences is gaining anything by such a division, but I am convinced that higher education and the matter as a whole are suffering. Interdepartmental barriers, first, prevent the efforts of scientists from being united, which would meet the interests of both the development of science and the training of personnel. And, second, they cut undergraduates off from the advanced experimental research base.

In the United States there are no academic institutes. There a large part of basis research is performed at higher educational institutions. Higher educational institutions are provided with better research equipment, and leading scientists work at them. For example, 10 Nobel Prize winners now work at Massachusetts Institute of Technology of the United States. Among undergraduates scientific work takes up far more space than at our higher educational institutions. And they acquire the skills of creative activity not in educational laboratories, but in scientific laboratories.

Incidentally, in developed countries the correlation between VUZ and sectorial science is also completely different. There higher educational institutions also carry out a large portion of the engineering development. For example, in the United States even such a serious department as the Department of Defense places more than half of its orders at universities. Industry also treats higher educational institutions differently. It invests much capital in the development of the material and technical base of educational institutions and sends there the first specimens of new equipment. Given such an approach industrial enterprises at the same time as the acquisition of new equipment can also hire specialists who know how to use this equipment.

Enterprises also more willingly make their material base available to higher educational institutions. I will cite the following example. Undergraduates of Massachusetts Institute of Technology produced with their own hands a modular space frame. The head space firm made available to the undergraduates a water tank and space suits so that they could work out the method of assembly under conditions close to the real ones. Then the frame was stowed on the Shuttle, and astronauts assembled it

in orbit. Now the undergraduates are developing a robot for semi-automatic assembly. It is now being tested and made ready for flight. The on-the-job training of future engineers takes place precisely in difficult independent jobs of this type.

Now hundreds of scientific and technical centers, which unite higher educational institutions and industrial enterprises, have already been established in the world. At them VUZ developments are transferred without delay to production. If a higher educational institution is well equipped, is properly organized, and works in cooperation with leading sectorial organizations, its role in scientific and technical progress becomes a leading one. So that this would also become the norm for us, higher educational institutions should receive orders for important developments.

The breaking down of interdepartmental barriers has begun in our country. The Moscow Physical Technical Institute and Novosibirsk State University have taken the most perceptible steps in this direction. The business contacts of engineering higher educational institutions with industry are being developed. But the level of cooperation for the present leaves much to be desired.

IZVESTIYA: Aleksey Stanislavovich, as the rector of one of the largest higher educational institutions, at which there are more than 12,000 undergraduates and nearly 3,500 instructors and scientists, what are you attempting to do in order to implement advanced ideas?

A. S. Yeliseyev: First, not I, but we. At the Moscow Higher Technical School there are many supporters of and active participants in radical changes. Of course, there are also opponents. But the majority are supporters, and what has been done is the work of the entire collective.

Now at the school restructuring is in full swing. The main thing, perhaps, is that we have succeeded in concentrating the scientific forces within large subdivisions. We have changed over to a new organizational structure. Seven scientific educational complexes are at its basis. Each complex consists of a scientific research institute and an educational faculty, which have an identical thematic orientation. The names of the complexes were chosen in conformity with it. For example, there are the Construction Materials and Technological Processes Complex, the Robotics and Integrated Automation Complex, and the Information Science and Control Systems Complex.

At the scientific research institutes there are on the average 400 permanent associates each. This corresponds to the size of the average academic institute. All the scientific research institutes intend to perform important scientific and experimental design jobs with the enlistment of instructors, undergraduates, and graduate students. The councils of the complexes will see to it that instruction keeps pace with scientific activity.

We assume that with time the differences between scientists and instructors of characteristic disciplines will disappear. For the present the principle of holding more than one job is in effect. All instructors are participating in scientific engineering development, while leading scientists are participating in the instruction of undergraduates.

In addition to internal restructuring, we have also expanded our external contacts. In each direction of the training of specialists in industry or at the Academy of Sciences (in some cases in both places) the base organizations have been specified. The Moscow Higher Technical School is concluding with them contracts on joint training. Together the programs of instruction are drawn up, the content of practical work is determined, and the themes of graduation projects are chosen. The base organizations make their shops and laboratories available for practical work and select the best specialists for participation in the educational process. While the Moscow Higher Technical School has opened there affiliates of its chairs.

At the Moscow Higher Technical School the syllabuses have been substantially revised. Basic and characteristic training has been intensified, the training of undergraduates in the humanities has been organized. The ultimate goal is to see to it that the country would get specialists, who have high standards and are completely prepared for independent engineering activity at a most advanced level.

Taking into account the enormous experience of our school in the training of engineering personnel, as well as the fact that we have a very wide range of specialties for machine building and instrument making sectors, the CPSU Central Committee and the USSR Council of Ministers adopted a special decision on the organization on the basis of the Moscow Higher Technical School of a higher educational institution of a new type.

In connection with the fact that the existing premises of the Moscow Higher Technical School do not make it possible to create a modern educational, scientific, and production base, the decision on the construction no far from the Moscow suburb of Podolsk of a new model VUZ complex was made. The buildings of the scientific research institutes and faculties, the main library, the House of Computer Technology, the Institute for the Improvement of Skills, and a pilot plant will be included in it. A residential region will be built for staff members of the school, while a student campus with a sports complex will be built for undergraduates.

IZVESTIYA: The restructuring, which has begun at your place, apparently, is not a painless process. Do you sense resistance of those who have begun to feel that they, as they say, may find themselves "offside"?

A. S. Yeliseyev: Of course, there is resistance, and this is natural. We want to involve everyone in modern creative work. It requires great exertion. The very raising of the question that a higher educational institution should be first of all a large scientific institution, while the educational process should be organized on the basis of real developments, is simply strange for many people. There are people who cannot change their ways. This is a social problem, it is necessary to solve it with the minimum costs.

IZVESTIYA: You spoke about American higher educational institutions, but in the United States, as in the overwhelming majority of countries, the practice of enlisting prominent world authorities for giving lectures, is being used extensively. How realistic is it to introduce such a practice for Soviet higher educational institutions as well?

A. S. Yeliseyev: In my opinion, this is vitally necessary. The enlistment of foreign scientists and the exchange of students should become a norm of our life. Our specialists enjoy prestige abroad, we have many invitations, and it would be entirely possible to set up permanent exchange without currency. For this we should have the opportunity to pay from the budget of the higher educational institution not 10 rubles per lecture, but in accordance with international standards, and to provide normal housing, food, and a cultural program. Unfortunately, the instructions of the Ministry of Finance for the present do not allow us to do this. And, honestly speaking, it is simply incomprehensible why we are hurting ourselves. Restructuring should all the same put an end to such phenomena.

Computerization of UkSSR Schoolrooms Profiled

18110035z Kiev RADYANSKA UKRAYINA in Ukrainian 28 Dec 88 p 2

[Article by V. Chopenko, Kiev: "When Will the Computer Come to the Classroom?"]

[Text] A course entitled "Fundamentals of Information Science and Computer Technology" was added to the school curriculum in 1985. The purpose of course is to form the knowledge, ability, and skills essential for practical utilization of the personal computer (PC). Academician A. P. Yershov, who was in charge of the project, stated at the time: "It would be wonderful if over the next five years we could establish a computer classroom in every rayon in the country. This means approximately 5,000 schools—schools which can be visited without buying an airplane ticket." A most modest goal. Why? Did it proceed from realistic capabilities? Soviet computer hardware—the Korvet and the Elektronika UKNTs—is less than state-of-the-art and is manufactured in small quantities. Judge for yourselves. In 1985 Ukrainian schools received 35 installations (an installation consists of an instructor's terminal and 10-16 student terminals), 90 in 1986, plus an additional 100 installations over the two following years. In order to fill in the gap we must resort to the purchase of Japanese Yamahas, for hard currency, of course. Because without the hardware we are like a horseback rider competing in an auto race.

In this republic there are 400 computer display classrooms for 9,200 secondary schools. The number is a little larger if we count the computer centers of patron organizations and at base enterprises, and computer classrooms at teachers' secondary schools, at pedagogic higher educational institutions, and at oblast advanced teacher training institutes, to which upper-graders also have access. This fails to solve the problem, however.

The shortage of personal computers has resulted in a so-called "chalk" information science. Wherever computers are lacking, teachers resort to chalk and blackboard. But how can one teach the structure of a computer without graphic aids? Are students going to master without graphic devices algorithmic thinking, the pattern of which differs substantially from the graphic pattern which is produced by the subjects of the school curriculum?

When we talk about the computer in the schools, we are talking not only about "fundamentals of information science..." but about overall computerization of the learning process.

But for this one must have instructional software, without which a computer is nothing but a telephone with a severed cord. But there was no coordinating center in this country which could guide both the methodological and practical activities of computer enthusiasts or could produce software and teaching methods materials at the national level. "Individual developers" captured the national market. This chorus of voices also included Kievans—the interministerial laboratory of the former UkSSR Ministry of Education and the Republic Academy of Sciences for study of electronic computer and microprocessor hardware in the school, headed by V. D. Dolyna. The laboratory has in fact become a republic scientific development center for this new curriculum course. In order to establish a more solid and lasting connection, the relationship was formally articulated in the form of development contracts with leading pedagogic higher educational institutions in the Ukraine. Laboratory personnel, although this was not part of their duties, approved and certified at educational institutions software which had been written at individual schools. It is interesting to note that upper-graders themselves made corrections and changes in the programs. The most actively-involved students became co-authors of the software packages.

One should bear in mind that the "Information Science" applications software which the schools receive from central sources are standard packages. For this reason each teacher and his students endeavor to modify them, to enrich them with their own innovations. The degree of

sophistication and the general applicability of the applications packages are evaluated by a team of experts from the national Algorithms and Teaching Software Fund. By the end of this year a regional fund will also be established in the Ukraine. Prominently figuring in this fund will be software developed by students at schools No 132 and 1145 in Kiev.

Universal computer literacy can be achieved, however, only if a sufficient number of trained teachers are available. Thus the personnel problem has become acute. Pedagogic higher educational institutions would require five years to begin turning out specialists in this new area of specialization. Education agencies were compelled hastily to set up specialized courses to provide additional training to almost 22,000 mathematics teachers and, in part, physics teachers. Even under these conditions, however, it was not possible entirely to fill in the gap. For this reason permission was given for applications programmers to take a second job in the schools, whereby they would be credited with teaching seniority. But these instructors, representing approximately 5 percent of the total, now require training in education.

It is true that the people at the UkSSR Ministry of Public Education are convinced that these problems can be resolved in the near future: at the present time 15 pedagogic higher educational institutions are training teachers who, on an equal basis with their principal subject area—physics, mathematics, and technical skills—will have an additional area of specialization—information science. And by 1990 students at all 22 pedagogic institutes in the Ukraine which have faculties of physics and mathematics will acquire an additional subject.

There is one more important problem connected with computerization of our schools—a psychological problem. There are apprehensions that the personal computer will dehumanize teaching. Or else it is asserted that the computer threatens intellectualization of pedagogic activity. It unquestionably places new demands on the teacher's professional knowledgeability, but it by no means diminishes his active role in the teaching and education process. In the usual classroom a teacher simultaneously handles two or three typological pupil subgroups, while in a computer classroom this number increases to dozens. One student, who is intellectually sharp, is a good many lessons ahead of the lesson schedule, another student, less sharp intellectually, has fallen behind, while still another has started simply playing with the computer. And the instructor must keep an eye on all of them. It is precisely the individual pace of advance which forces a teacher to work in a mode similar to the operator of multiple machine tools.

Specialists are also concerned by another question: what is the best age at which to introduce children to electronics? The answer is as follows: the earlier a youngster becomes accustomed to computerization, the easier and faster he overcomes the psychological barrier. There is one essential condition: he must be able to read. So are information science classes gradually to appear on the class schedule of the intermediate grades, and later in the youngest grades as well?

"Of course!" V. D. Dolyna is convinced. "There is already now a reasonable basis for introducing the Fundamentals of Information Science course beginning with the seventh grade. For three years now our laboratory has been conducting an experiment with six-year-olds. The results are gratifying. The children feel comfortable in front of the computer display and affectionately call the computer their friend. In my opinion we have many reasons for concern in this country. In Bulgaria, for example, today there is not a single schoolchild who has not worked with the Pravets or IMKO personal computers, which were designed specifically for instructional needs. The country's best poets, artists, layout designers, and journalists have produced for the youngest children a school textbook on fundamentals of contact with the PC. In Bulgaria for six years now they have been teaching even kindergartners familiarization with electronics. And yet in this country we have restrictions: provisional recommendations permit a child to spend only 25 minutes a week in front of a computer display, and yet children sit for hours in front of a TV set, which is much more harmful than a PC display as regards static charges, radiation emissions, and eye fatigue."

Valentyn Dmytrovych is right: with these restrictions it is hardly likely that schoolchildren will soon master the capabilities of computers. Presently existing supercomputers perform operations to the extent of six brain cells (and these number 14 billion). The Japanese neurocomputer made by Fujitsu, which will "think" independently and act autonomously, is equivalent in its capabilities to 100,000 nerve cells. This is a symbiosis of biotechnology and electronics. While we were in the process of developing and adopting 8-bit personal computers, they became totally obsolete. And yet we are going to be using these machines to teach not today's but tomorrow's schoolchildren, those who will become engineers in the 21st century.

I shall end my not very optimistic remarks with parting words quoted from the already-mentioned Academician A. P. Yershov: "We are launching a great ship named 'School Information Science'. It is the task of each and every one of us to rig and fit this ship out, to safeguard its buoyancy and maneuverability, to keep up with it and to transport our children and grandchildren aboard this ship into the 21st century fully prepared for future, truly epochal changes...." You and I are the helmsmen of this giant ship. It depends on us whether it makes its way out to sea or runs aground on a shoal.

CPSU Central Committee Project on 'Information Society' Described

18140220 Moscow NTR: PROBLEMY I RESHENIYA in Russian No 6 (93), 1989 pp 1, 4-5

[Three concepts of an: "Information Society. What Will It Be Like?"; introduction by V. Korchagin, deputy chairman, USSR GKVTI, leader of work group for considering the versions of the project on an "information society" concept; passages in italics and boldface as published]

[Text] *From the CPSU Central Committee Resolution "On Developing a Concept of Information Society" of 15 July 1988:*

The USSR Gosplan, USSR Academy of Sciences, USSR State Committee for Science and Technology, and USSR Council of Ministers Bureau on Social Issues, jointly with interested ministries and departments should:

Draft versions of a project for an information society concept in 1988 on a competitive basis, and inform the CPSU Central Committee and USSR Council of Ministers of the results of this contest in the first quarter of 1989;

Organize the subsequent broad public discussion of the versions of said concept and submit them for the USSR Supreme Soviet's consideration in the first half of 1989.

Izvestiya TsK KPSS, [News of the CPSU Central Committee] 1989, No 1, p 55

In accordance with this resolution, two work groups of scientists and specialists, under the leadership of academicians D.M. Gvishiani and V.S. Mikhalevich, were formed in order to develop versions of a project for a concept of information society.

At the end of 1988, the project versions developed by these groups were submitted for the competition, as well as a version of the concept prepared by the USSR GKVTI All-Union Scientific Research Institute on Problems of Computer Hardware and Information Science, and yet another version, proposed by Professor N.G. Zaytsev, doctor of technical sciences, and V.F. Popov.

A commission under the leadership of N.V. Gorshkov, USSR GKVTI chairman, was formed to consider these versions and organize their public discussion. It included the leaders of the work groups for developing versions of the project concept, leading scientists and specialists of the USSR Academy of Science and of sectorial institutes, and leaders of ministries and departments.

In February 1989, at a joint conference of the bureaus of the USSR Academy of Sciences Department of Information Science, Computer Equipment and Automation and the USSR GKVTI [Science & Technology Council], the reports of the scientists and specialists, who presented all of the above-mentioned versions of the project concept at the competition, were heard. The joint conference decided that it would be impossible to accept any one of these as optimal, since each most fully developed only certain aspects of the problem of the informatization of society. The joint conference recommended that the further development of the project be done on the basis of three versions, presented by the work groups led by academicians D.M. Gvishiani and V.F. Mikhalevich, as well as that of the USSR GKVTI All-Union [Scientific Research Institute] for Computer Equipment and Information Science Problems (VNIIPVTI). It recommended that the work groups and VNIIPVTI rework the versions of the project concept and send them for expert analysis to leading scientists and specialists in the field of information science, as well as to interested ministries and departments of the USSR and the union republics.

For purposes of broad public discussion of the project concept, the USSR GKVTI was instructed to hold an all-union conference in the second quarter of 1989, inviting leading specialists and representatives of public organizations. The problems of informatization will also be considered at the International "Informatization of Social Production" Conference, organized by the USSR GKNT. The commission should ensure the evaluation and generalization of the results of the public discussion of the concept, and should prepare the necessary documents for submission in June 1989, in the established procedure, for the USSR Supreme Soviet's consideration.

In presenting the readers with abbreviated versions of the project concepts of an information society (see pp 4-5), we hope for the attentive and interested participation of the readers, who, undoubtedly, realize the importance of the proper selection of priority directions for developing the processes of the informatization of society.

We would be grateful to all readers for any comments and suggestions offered, which we ask you to send to the address: 103009 Moscow, Gertsen St., Bldg. 14/2.

In shortened form, we present three versions of the concept of an Soviet information society for the readers' discussion. They were drafted by the work groups, formed on the basis of the USSR AS VNIISI (led by Academician D.M. Gvishiani), the UkSSR Academy of Sciences Institute of Cybernetics imeni Glushkov (led by UkSSR AS Academician V.S Mikhalevich), and the collective of the All-Union Institute for Computer Equipment and Information Science Problems of the USSR GKVTI (led by institute director V.G. Zakharov).

The preambles were removed from all three concepts. They are similar in principle, containing like characteristics of the lag of domestic informatization behind the achievements of the U.S., Japan, and other developed countries of the West. We did this because the arguments

and conclusions contained in the preambles, characterizing the critical situation that has formed in the country, have been covered thoroughly and in sufficient detail in the specialized literature, professional periodicals and the mass information media.

The proposed versions of the concepts were supported by specific calculations and technological substantiations. These have been omitted in our publication both due to a lack a space, as well as in order to focus attention on the fundamental principles on which each version relies. Precisely these are presented for discussion today.

This discussion is extremely topical, due to the fact that the informatization of society is a global social process of production and of the ubiquitous use of information as a social resource. It ensures the intensification of the economy and acceleration of the country's scientific and technical progress and the processes of democratization and intellectualization of society. Informatization stipulates the mass application of systems for gathering, processing, transmitting and storing information on the basis of microprocessors, computer equipment and systems for transmitting information, and the application of new information technologies.

In evaluating the three concepts presented, obviously, preference should be given to everything in them which takes the specific nature of information and knowledge into account to the greatest extent. Above all, this is their ability to reveal the new, essentially unlimited possibilities concealed within the processes occurring in nature and society. Information and knowledge are the key to understanding and utilizing these processes. This bestows the informatization of society the role of a powerful factor in progress, in accelerating the restructuring occurring in the country, its precious resource.

The VNIISI Concept

The informatization of Soviet society is the scientific and technical foundation of restructuring.

Its main components are:

— New and renovating information structures, which support the work of economic establishments, bodies of power and management, and social institutions, and regulate everyday economic and sociocultural life;

— New information technologies (NIT), which make it possible to acquire, transmit, and use knowledge—the main information resource for solving the problems of social development;

— The information infrastructure which, using technical systems (primarily electronic computers and computer equipment) and organization and economic mechanisms, ensures the interconnection and interaction of information structures and new information technologies.

In order to understand what we must start with, we must acknowledge the bitter truth. No matter what indicators one uses to evaluate the level of informatization—the quantity and quality of information equipment, the scales and efficiency of its use, and so on—our country has lagged catastrophically not only behind leading capitalist, but also behind many developing countries, and this gap is gradually growing.

One of the main problems lies in the fact that today our society is socially, economically, and psychologically unprepared for informatization or, in other words, society's information needs have not been shaped. We did not realize that knowledge and information technologies are the main resources for solving the urgent social and economic problems which have been accumulating. We did not acknowledge the need to allocate sufficiently large funds for informatization, although we did begin to think about graphic foreign experience, about examples of accelerated development, such as that of South Korea, Singapore, and China, which recently started on the path of informatization.

The task of shaping society's information needs and accelerating informatization requires serious, revolutionary solutions.

Domestic and world experience offer two possible ways to implement large-scale programs, which include the program for the informatization of society.

The first way is to promote the well-known slogan "Catch up and surpass!," to allocate all possible state resources, to create special management agencies, to entirely centralize and regulate the process, and to define time periods and volumes for all assignments.

The second, fundamentally different way requires creating only the most necessary conditions for informatization at the state's expense—developing an information infrastructure, supporting scientific developments in this field, creating a system for training cadres and for the psychological preparation of society, and developing the corresponding economic and legal mechanisms. The process of informatization itself, the creation of information products and services, is provided for by attracting the resources of users, who obtain an opportunity to control the quality and structure of the necessary technical systems. Meanwhile, the country should actively participate in the international division of labor in information science and computer hardware, i.e., at the expense of goal-oriented foreign purchases, developing

the production of competitive information products, the sale of which compensates for the expenses, instead of repeating the path already taken by many countries.

The proposed concept is based on the principles of the second way.

The basic positions of the concept can be formulated in the following manner.

1. The informatization of society is a way to solve the basic social problem of raising man's standard and quality of living and for accelerating the development of socialist society. The results of informatization should be obvious; the new information products and new quality of information services should improve life, labor and home conditions and should provide people access to social and political information and make their participation in public discussions, in the process of making decisions on vitally important questions, such as the ecology, construction, price-setting, etc., more active.

2. The process of informatization should be financed with a minimum amount of centralized state capital investments, which will offer the possibility of not diverting funds and resources from other social programs. Economic mechanisms should be created which stimulate the attraction of all types of resources from interested enterprises and organizations, the population, foreign and, mainly, internal credit, etc.

3. In order to solve the priority problem of preparing society for informatization, it is necessary to expand the sale to the population of computers and components for them, to create computer clubs, centers for instruction, game centers, demonstrative establishments, and model informatization zones, which demonstrate the new possibilities for using information resources in the political and economic life of society and of all strata of the population.

4. In the first stage of informatization, the anticipatory development of scientific and technical directions, which directly ensure the creation and effective use of new information technologies and the modernization of the design, technological and industrial base for producing informatization facilities, is called for. Using economic measures, the state should support and stimulate the development of various information systems on the basis of foreign equipment, not obstructing purchases of it; it should encourage the creation of joint enterprises and cooperatives and any form of new economic activity in the field of informatization, within the framework of the corresponding legislation. In creating a modern scientific and technical and industrial base, it is important not to permit a monopoly of producers, and to confine oneself to conditions of competitive design.

The concept singles out the following stages in the development of informatization.

1989-1992. The creation of social, economic and technical conditions for the formation and initial satisfaction of society's information needs:

— the preparation, introduction and amendment of legal and economic standards, which provide for the functioning of information as a commodity, stimulate creative activity in this sphere, regulate access to information, and define the rules for crossing borders with information flows;

— the formation of the first commercial data bases;

— satisfaction of the initial hunger for computer and information equipment at relatively high prices;

— the development and beginning of the formation of an information infrastructure and a market for information products and services.

1993-1996. Developing the information infrastructure of Soviet society and ensuring conditions for its inclusion in the world structure:

— bringing the standards for legal and economic practice up to the level of world standards;

— complete acknowledgment in the country and abroad of the idea of including the USSR in world processes;

— providing for the computer and information equipment needs of the country for classes of mass-application models (without large- and supercomputers);

— the development of an extensive network of commercial and noncommercial data bases;

— the solution of some infrastructure problems, in particular the development of internal and international telephone communications.

1997-2000. The development and satisfaction of the basic information needs of Soviet society and equal participation in the international division of labor:

— free information exchange with the world;

— inclusion in world markets;

— the production of a broad spectrum of information products and services within the framework of an international division of labor.

What will informatization give man?

The use of new information technologies is related to qualitative changes in the content of many types of labor. Labor would become more intellectual, opening up a

possibility for the maximum realization of the individual's creative potential. New technologies, built into technological processes, make it possible to substantially reduce the share of heavy and low-skilled labor.

The new information technologies ensure continuous tracking and management of the state of the surrounding environment and provide timely warnings for people about unfavorable ecological situations, which has enormous significance for preserving man's health in our time.

In health care, informatization elevates the training and professional culture of medical personnel to a new level, enables the more effective use of material, financial and professional resources, and raises the population's ecological and medical culture. Systems for comprehensively monitoring a patient's health and for diagnosis will become widespread.

Informatization contributes to the democratization of education and the individualization of the instruction process.

Informatization creates new possibilities for improving people's everyday life, freeing them of hassles related to trade and communal accounts, making it possible to do diverse, highly productive work at home, substantially raising comfort while in fact reducing the cost of everyday appliances and services.

The UkSSR AS Institute of Cybernetics Concept

The set of positions and ideas:

I. Main conceptual assertion: the programs for the country's socioeconomic development will not be implemented without informatization, as a powerful factor in restructuring.

1. Basic conceptual ideas:

—making knowledge more active (the enormous developing reserves of knowledge and experience, and the entire intellectual potential of society should actively participate in the daily activity of all members of society, and should increase efficiency in social production and comfort in the social sphere);

—the quality of information and knowledge (information should be accurate, reliable, timely, accessible, understandable, pertinent, and conducive to action);

—the intellectualization of computer equipment and information science systems (hardware and software system should possess properties of intelligence; the capability of recognizing form and situation, understanding and using knowledge, making logical conclusions, interacting with the user in natural language, etc.);

—mathematical support for the decisions being made (the making of substantiated decisions should come to replace arbitrary ones. Mathematical modeling, computer experiments, systems analysis, forecasting, the generation and evaluation of variants, and planning optimization methods should be a component part of the information service system and should act as mathematical support for knowledge processes and for making decisions at all levels);

—integration (informatization should support and develop the overall integration tendencies in industry and in society on the whole, flexibly combining with the concept of individualization and specialization);

—technological breakthrough by way of informatization (lies in the organic combination of information technologies with industrial technologies, providing for new quality in the production sphere—intelligent robots, automated factories, etc.);

—the self-development of informatization (should be ensured at the early stages via a proper policy for capital investments and the flexible combination of centralized management with mass initiative, cooperatives, etc.);

—the humanization of informatization (determines man's self-improvement and the development of culture and of society's level of civilization on the whole);

—strengthening the structure of society (informatization should strengthen the state structure, implementing the principle: strong center, strong local agencies; it should contribute to strengthening the family and to improving interethnic relations);

—a self-defense system for informatization (the great achievements of a nation bring the people not only great good, but also great evil; the system for informatization should possess the capability of self-defense from possible negative consequences);

—potential possibilities for informatization (makes it possible to implement its conceptual ideas and familiarize all members of society with it).

2. The potential possibilities of informatization systems enable the implementation of these conceptual ideas.

3. The look of the system for informatization: in informatization, we single out an information process, directly oriented toward the users, as the basis. All support for this process relates to the concept of "infrastructure," i.e., the sum total of technical, software, information, economic, organizational and other means and methods, which create conditions for effectively utilizing informatization in the interests of society.

II. Basic problems with the informatization of Soviet society and ways to solve them.

1. The creation of a balanced infrastructure for informatization, which includes:

—a receiving-transmitting environment;

—a network of information and computer centers which interact through the receiving-transmitting environment;

—a system of data and knowledge bases;

—means for informatization;

—information technologies as methods for effectively using the means for informatization;

—a system of organizations and enterprises which support the processes of informatization.

The basic tasks in creating a receiving-transmitting environment are:

—developing an experimental zone on the basis of existing channels of communication, using commutation methods and channels, and ensuring the possibility of interaction with departmental networks;

—the creation in this zone of branched systems for new information services;

—the implementation of information standards for information transmission;

—the development of satellite communications lines, with the mastery of the millimeter range;

—the implementation (no later than the year 2000) of high-speed data transmission systems in the main directions.

In order to create a state network of data bases (GSBD) it is necessary:

—to establish the organizational and legal status of the GSBD;

—to ensure the design, development, and introduction of the GSBD;

—to develop a set of standards, guiding the methodological and normative materials that provide for the creation, functioning and development of GSBD;

—to develop an economic mechanism for stimulating the creation of data bases, their circulation and utilization.

In the area of producing and using information science facilities, it is necessary: to change the structure of the production of computer equipment, to increase the production of peripheral equipment, and to improve the product list, its technological nature, and the technical characteristics of configuration means, network equipment, and personal computers. The production of task-oriented computers should be developed and organized: database computers, computers for operating in networks, and supercomputers and mini-supercomputers for solving complex scientific research and national economic problems.

In the field of technology, basic research should be done on a new component base for computers.

The central problems in information technology are the creation and management of expert systems, artificial intelligence systems, user interaction with the system, and intelligent interfaces. In order to solve these problems, a new national economic complex must be formed for the information science industry.

2. The development of scientific research.

Informatization should become an integral social order for all sectors of science: philosophy, sociology, economics, biology, the complex of information and management sciences, computer sciences, physical and mathematical sciences, chemistry, and materials science. The rates of development of research in the interests of informatization can be increased by way of informatization itself, i.e., by using data and knowledge bases and by automating scientific research.

3. The preparation of society for informatization.

The problem lies in the fact that society on the whole is still not ready for informatization. In order to solve this problem, it is necessary to utilize the media for mass scientific propaganda on informatization and provide universal information-computer education and upbringing. A law on informatization should also be drafted and passed, thus creating an environment for mass computer and information literacy.

III. The influence of informatization on the development of various spheres of society.

Informatization has an integral influence on all spheres of society's life, much like electrification, automation, etc.

IV. Scales of and resources for informatization.

It is expedient to implement the informatization of our society in two stages:

The first stage is the minimum program (1989-1995):

—the implementation of measures for scientific, political, socioeconomic and organizational support for the informatization of society;

—providing for the population's computer literacy, and forming the new thinking and an information culture;

—the creation of an economic mechanism for an information science industry;

—the development of legal support for informatization;

—the development of work on promising designs for computers and computer systems;

—the creation and mastery of basic capacities for the mass production of personal computers, microprocessors and other computer hardware;

—the development of a state-wide information receiving-transmitting environment;

—the creation of first-priority data bases and knowledge bases;

—the creation of a software and program industry;

—the creation of the first phase for an infrastructure for informatization;

—the creation of experimental informatization zones (republic, city, rayon, economic sector, etc.);

—the implementation of broad-scale measures for effective international cooperation in the field of informatization.

Second stage (1996-2005):

—the creation of the first phase of an all-union complex for the informatization of the country;

—the extensive application of informatization systems in all spheres of human activity. Ensuring the mass use of new information technologies, data bases and knowledge bases, and artificial intelligence systems;

—the mass application of the latest information service systems for the population ("Videotekst," "Teletekst," "Telefaks," and others);

—the implementation of mass automation of work places, electronization of equipment, robotization of industry, and automation of control processes in the material production sphere, as well as in the social and spiritual spheres;

—active and direct participation in strategic international projects for the informatization of society.

It is assumed that the gradual self-support of the process of informatization will be ensured in the second stage.

VNII PVTI Concept

We believe that the version of the project concept of an information society in the USSR should answer five main questions. 1) What goals should be achieved? 2) What central (key) problems must be solved in order to achieve these goals? 3) Along what scientific and technical directions are the solutions of key problems possible? 4) What basic measures (organizational, economic, industrial, and others) can provide these solutions? 5) What kind of resource support is necessary for this, and what kind of result will it yield?

Among the main goals, we include: 1) raising the standard of living and satisfying the growing social needs of the Soviet people; 2) strengthening social and political institutions, and democratization of society; 3) intensifying the development of the national economy and accelerating the country's scientific and technical progress; 4) active inclusion in the international division of labor and the internationalization of the economy; 5) reducing military expenditures and a social re-orientation of the defense industry toward the needs of the national economy.

The modernization of armaments using information science systems makes it possible to maintain the country's defense capability within the limits of reasonable sufficiency.

Among the key problems in the informatization of our society, we include: 1) raising the technical level and volumes of the production of computer hardware and information science systems; 2) creating the material base for an informatization infrastructure; 3) extensively applying computer hardware, microelectronics and information science in the national economy and in the social sphere; 4) providing for the information culture of the population, and automating the processes of instructing, training and retraining of cadres; 5) creating a legal and organizational-economic incentive mechanism for the processes of developing society's informatization; 6) neutralizing the negative social consequences of informatization; 7) creating an independent sector for the broad mass-production of hardware and software for computers, microelectronics and information science.

Our conceptual proposals on selecting the priority fields for informatization, on developing its basic components, on resource support in the stages of the planned period, and on the most important organizational and economic measures of state policy for the informatization of society, are decisive.

Five basic areas for the informatization of society, encompassing both the social sphere and material production (proportions of the delivered volumes of computer hardware and information science systems are indicated in parentheses), are singled out: comprehensive automation of labor, technological and industrial processes (30 percent); informatization of scientific

research, design work and technological preparation of production (28 percent); informatization of organizational and economic management (19 percent); informatization of the processes of instructing and training cadres (11 percent); informatization of the service and everyday sphere for the population (12 percent).

The intensification in the production of machine tools (a growth in production volumes by a factor of 12-14 by the year 2005), automated on the basis of built-in microprocessor control and regulation systems, machines, equipment, and instruments, is proposed. The largest production growth is proposed for the output of household automated equipment. Comprehensive systems for automating the development and production of output in all sectors of the national economy, as well as ASUTP [automated technological process control systems], should be created and applied dynamically.

The application of automated systems (SAPR, ASNI) in all design organizations and scientific research institutes and re-equipping the work places of specialists with automated work places (ARM) is proposed in scientific research, design work and the technological preparation of production. The provision of virtually all management workers (managers, office workers) with personal computers and, on their basis, developing "electronic offices," is proposed.

The social sphere is of the highest priority in terms of the rates of development of informatization, which is determined by the rate of saturation with computer hardware and information science systems. Thus, the maximum volume delivery of personal computers should be sent to the education sphere (schools, tekhnikums, VUZs [Higher Educational Institution]) and for use in the homes of the population. By the year 2005, the number of household personal computers should reach 15 million units. In this regard, more than 80 percent of work places for school children and 100 percent of the work places for students should be equipped with computer hardware and information science systems. Automated technological systems should be extensively applied in trade, health care, transportation and communications. The creation of information systems for serving the population and of large-scale automated teaching systems (AOS) in various areas of knowledge is proposed.

In solving the group of problems which also relate to creating an informatization infrastructure, the proposal calls for a sharp increase in the volume of production, the technical and economic level and the quality of the information science systems being developed and produced by industry, a significant increase in their intellectual possibilities, and the achievement of a world technical and economic level for the leading domestic computer systems by 1995, and of series- and mass-produced models by the years 2000-2005.

Just to satisfy the first-priority needs of the national economy, the production volume of computer and microelectronic hardware should increase by a factor of approximately 1.5-2 over the 5-year period. The scales for the production and application of computer and microprocessor systems in the 13th-15th 5-year periods require raising the volume of development of all software in the country by a factor of 8-9 by the year 2005, while the amount of the systems software and standard industrial applied program packages being created should increase by a factor of 20-30.

The accelerated development of artificial intelligence systems (SII) is of exceptional significance for the intensifying informatization. These systems accumulate the latest achievements in the fields of computer software and hardware and have tremendous promise for use both in the national economy and in the military. For the broad-scale creation and application of SII, the draft concept proposes intensifying the training of appropriate specialists, increasing their quantity by no less than 7-10 thousand people per 5-year period, and significantly strengthening work to create expert systems, computer systems for supporting SII on the basis of high-performance computers for symbolic information processing (up to 100 billion operations per second), computer signal processing (up to 10,000 billion operations per second), computer knowledge bases, and so forth.

In developing the informatization infrastructure, the solution of the problems of transmitting information take on decisive significance. The draft concept considers converting to a new technological base, which calls for mastering new transmission systems (fiber optic, laser, satellite) and digitization of the transmission and commutation processes. This should make it possible to create integral digital network communications in the country in the 15th 5-year period. This network ensures the high speed (up to several Gbit/s) and reliability (error probability of 10^{-8}—10^{-9} per character) of information transmission. The creation of this network also stipulates the further development of automated telephone services: the transmission of speech, data, and text (telex, burofaks, videoteks, telefaks, and others). The most important part of the telecommunications infrastructure for the informatization of society should be the statewide data transmission system (OGSPD), which is being created and takes the need to integrate computer equipment within computer networks into consideration.

Society's information potential should be gathered in the form of data bases (BD) and, in the future, knowledge bases. In order to coordinate the creation of the most important general purpose data bases and to implement a unified technical policy in developing local data bases in individual projects of the national economy, the organization of a state database system (GSBD) is necessary. The volume of information stored in the GSBD should be increased by a factor of approximately of 4-5 over a 5-year period. It is well known that the undeveloped nature of the computer services sphere in the

country has led to the irrational use of computer resources. The situation with providing repair, set-up of computer equipment and information science systems, and the inclusion of software and other intellectual services for the user, is no better. The most effective organization of the indicated work will be achieved by creating a State System for Computer Services and Maintenance (GSSO).

The successful solution of the key problems of informatization is possible only given the coordinated interaction of the leading sectors of the economy. The planned scales of work to develop the basic components of informatization are comparable to the scales in existing national economic complexes. Therefore, the creation of a **complex for the information science industry (KPI)** is proposed as the most important organizational and economic measure of state policy in the project concept. This would be an intersectorial national economic complex, ensuring the development, production, circulation (storage, transport, sale, operation, utilization), and support for the use of computer and information science systems, information technologies, and automated systems.

The organizational formation of the KPI, in an initial approximation, could be similar to the energy complex. It is possible to create, for example, a USSR Council of Ministers Bureau on Information Science, the competence of which should include implementing a state-wide policy for the informatization of society, including the application in the national economy of new efficient economic, legal, and financial levers of information and the overall coordination of the activity of the sectors for producing hardware and software systems for information science and computers.

The Bureau on Information Science should coordinate activity in the area of informatization, and is based on financial control levers—the allocation by ministries and departments of the appropriate funds within the framework of a state order and via extra-departmental financial organizations and enterprises for fulfilling work of a lesser scale. The necessary management flexibility is achieved by regulating the correlations between the quantity of state order funds and that of extra-departmental financing.

A specialized State Information Science Bank with three departments—investment, innovation and international—created within the framework of the KPI, could become an instrument for implementing the financial policy of the USSR Council of Ministers Bureau on Information Science.

Our project concept takes the questions of resource conservation in each 5-year stage of implementation of informatization (13th-15th 5-year periods) into account in a number of macroeconomic indicators (financial, material, cadre, and others). The resource outlays here are sufficiently large and, therefore, the questions of the efficiency and results of informatization are extremely important. In the project concept documents (and partially in our article as well), quantitative and qualitative indicators are given which characterize the expected results of informatization in material production and in the social sphere. They are based (with corresponding refinements) on similar previously-developed long-term programs in the field of computers and information science and, in the future, will be refined both in the regular 5-year plans, as well as during the development of the state-wide program for the informatization of society.

Information Technology Lags Despite High Investment

18140224 Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Apr 89 p 1

[Article by Doctor of Technical Sciences G. Artamonov, professor of the Moscow Aviation Institute imeni Sergo Ordzhonikidze, under the rubric "Let Us Take a Look at Tomorrow": "The Priorities of Information"; first paragraph is SOTSIALISTICHESKAYA INDUSTRIYA introduction]

[Text] The survey of specialists in the field of information science and computer technology, which was conducted by personnel of the computer center of the Academy of Social Sciences attached to the CPSU Central Committee, showed: 95 percent of those surveyed do not see thus far radical changes in the informatization of society. Is it not strange: in a year we produce computer hardware worth several billion rubles, turn over 500 automated control systems and information processing systems each, but there are no changes?

Many people believe that the reason lies in the low saturation of the national economy with computers. In confirmation they usually cite the experience of developed capitalist countries—first of all the United States. Indeed, in the United States there are now 35 million personal computers alone, we have approximately one three-hundredth as many. But it would be logical to expect that in our homeland very scarce computer hardware is being used superintensively. Nothing of the sort: according to the testimony of the majority of the same specialists, in the country only a negligible portion of the pool of computers is being used efficiently.

It turned out that way because, alas, by the informatization of society they have begun to understand almost exclusively the development of computers, peripherals, and software—in essence a set of tools. Meanwhile, when economists and sociologists in the West began to talk about the "information society," which is succeeding industrial society, they meant not so much the quantity of units of computer hardware per capita as the stunning growth rate of the amounts of information, which is generated and consumed by society. Suffice it to recall that in the United States half of all the working people are now engaged in the generation, dissemination, and

processing of different types of information! Of course, it would be impossible to manage such a flow of knowledge without electronic hardware. But information is still primary. The need of society for the acceleration and increase of the flows of information is prompting the development of new computers, information networks, and so on, and not vice versa.

The market economy was built and is being built on the equal interest of the seller and buyer in each other. The intensive movement of goods and services is impossible without the intensive movement of information: advertising, technical, economic, and other information. Long before the appearance of the first computers trade fairs and exchanges: commodity, currency, and stock exchanges, met the demand for rapid and precise knowledge. Now in addition to them in the United States alone there are 3,300 public electronic databases, which encompass nearly all spheres of human activity, and it is a question of the establishment of a worldwide computer network for information exchange.

In the USSR the elimination of the commodity exchange and labor exchange at the turn between the 1920's and 1930's destroyed the last centers of intensive information exchange. In the administrative command system of the management of the national economy knowledge moves not under the influence of the laws of supply and demand, but in accordance with bureaucratic convention: reports from the bottom up, instructions from the top down. The equal "seller-buyer," "producer-consumer" interrelations were replaced by the unequal "benefactor-petitioner," "chief-subordinate" interrelations. But the participants in unequal economic interrelations are not interested in the accurate, complete, and prompt information of each other. Moreover, they are interested in the concealing of information and in its obstruction: the lower "tiers," in order to ensure relatively carefree conditions of existence, the top ones, in order to conceal mistakes and blunders in management and to preserve the status of benefactors. As a result the process of information exchange is ceasing to be vitally necessary. The information flows, which circulate in society, can be artificially reduced or inflated at the discretion of administrators and subject to the situation. The consequence is stagnation in the development of equipment for information processing and transmission. This applies not only to computers: our printing houses and automated telephone exchanges, our mail and transportation lines have become hopelessly obsolete.

Not at all by chance did the period of the greatest successes of our cybernetics fall to the time of Khrushchev's "thaw," when many windows to the outside world were abruptly opened wide. But our lag in the area of information generation began to be felt already by the middle of the 1960's. The leadership of that time saw the reason in an essential, but not the primary circumstance: in the low reliability and standardization of domestic computer hardware. The program of the computerization of the country, which was oriented toward the copying of western hardware and software models, emerged. This orientation is also in effect to this day.

Other attempts to copy the solutions of others in the area of information generation were also made. In the second half of the 1960's, for example, they decided to develop a network of collective-use computer centers and a state data transmission network and announced the establishment of public databases in science and technology. For this hundreds of institutes of the union, republic, regional, and sectorial levels were opened.

It is incorrect to assert that these efforts were in vain. But owing to the fact that the adopted decisions were dictated not so much by the needs of the economy as by the will of the leadership, their return turned out to be low, while our lag in the area of informatization continued to increase. There are no data transmission networks, except for narrow departmental telephone networks. The isolated systems of remote access to databases are accessible to far from everyone and operate in an experimental session mode.

In order to break away from the formed situation, it is necessary to realize at last that in information generation the same economic laws operate as in physical production. The most important one of them is the law of supply and demand, the disregard of which in the area of physical production also brought us many troubles. Consequently, any concept of the informatization of the country should be aimed first of all at the stimulation of conditions, under which a real, not a contrived demand for complete and reliable information appears. Such a demand will appear only in case of the changeover of the economy to a market track and to contractual relations between enterprises. For example, it is necessary, apparently, to link the development of the wholesale trade system with the establishment of a network of commodity exchanges and trade fairs. Each of them should become an independent cost accounting commercial enterprise. They will not be able to exist without being tied into a common information network, and precisely this circumstance without any orders and programs will force them to establish such a network in the shortest time.

If we leave aside the purely economic aspects of the problem (although, I will repeat, without resolute changes in the economy any program of informatization will again sink into the sand), this concept should envisage first of all the development of the conditions for the unimpeded circulation, retrieval, and processing of any required information at any time of day. From this standpoint the reliance on the saturation of the end users with computer hardware seems mistaken. They clearly need hardware, but without efficient information transmission channels it will remain idle. At the same time the country simply does not have enough forces and assets for the establishment of information networks

simultaneously in all sectors of the national economy. Apparently, it is necessary to start by making the maximum use of the already established networks. I have in mind the USSR Ministry of Communications.

In the country there are 91,000 communications departments. Of them 63,000 are rural departments. If initially we limit ourselves to the urban departments (communication with them is more or less stable, and industry is concentrated primarily around them) and provide each one if only with one terminal that operates round the clock, an enormous step forward will immediately be taken in the establishment of a unified information network of the country. While 30,000 terminals is already entirely within the power of our industry.

The sequence of the development of information flows in state departments should be included in the concept of the informatization of the country. Once again from the standpoint of the already existing reserves the development of the information network that serves transportation should be first. The Ministry of Civil Aviation and the Ministry of Railways—our two main "carriers"—have their own sufficiently branched network, and it is possible to carry out its supply with computer hardware comparatively more rapidly and comparatively less expensively than in the areas where it will actually be necessary to start from scratch.

Gradually the sectorial networks will merge into the unified information infrastructure of the country. Only such an orientation of the concept being developed of the informatization of the country will actually give us a chance to join the ranks of information powers.

Legal Aspects of Information Science

18140238a Kiev PRAVDA UKRAINY in Russian 7 Mar 89 p 2

[Article by Corresponding Member of the Ukrainian SSR Academy of Sciences Yu. Shemchushenko and G. Mulyarenko, head of a department of the VMNIIPS: "The Law for Information Science"; first paragraph is PRAVDA UKRAINY introduction]

[Text] Under present conditions it has become obvious that information science is a most important reserve of economic growth. Precisely for this reason versions of the program of the informatization of Soviet society are being drafted.

From 26 February to 2 March, an all-union conference for the discussion of the concept of the legal support of the computer software industry (which will be a part of the program of informatization, which is being prepared) was held in Kiev at the Institute of State and Law of the Ukrainian SSR Academy of Sciences. Both the concept itself and the most effective means of implementing this program were discussed at the conference.

The conference was held by the USSR State Committee for Computer Technology and Information Science jointly with representatives of 15 interested ministries, scientific research institutes, and higher educational institutions of the country. Specialists of Moscow, Kiev, Leningrad, Tallinn, Kalinin, and other cities took part in it.

The questions of the protection of the rights of the authors of algorithms and programs, the development of the organizational and legal forms of the operation of the information science industry, and many others were touched upon during the discussion. Particular attention was devoted to proposals on the improvement of prevailing economic legislation and on the drafting of standard procedural documents in this specific area.

The conference participants spoke out in support of the extensive development of the new standard legal field—so-called legislation in the field of information science.

As a result of the work of the conference a unified methodological approach to the accomplishment of the tasks of legal support was formulated, the broad-scale cooperation of the scientific forces, which are being enlisted in the accomplishment of these tasks, was achieved, and the submitted concept of the program and other organizational documents were also approved.

New Computer Groups Discuss Goals, Organization

18140238b Moscow NTR: PROBLEMY I RESHENIYA in Russian No 7 (94), 1989 pp 4-5

[Article by Yu. Meshkov, V. Pokrovskiy, B. Polukhin, and An. Shakhov under the rubric "Panorama": "Eleven Plenipotentiaries of the All-Union Society for Knowledge"; first four paragraphs as NTR: PROBLEMY I RESHENIYA introduction; passages in italics as published]

[Text] "Last year I read in NTR about the idea of establishing the Interznaniye International Association," writes Leningrader A. Zavyalov in his letter to the editorial board. "I would like to learn in greater detail what is being done today for its realization."

Such a letter is not an individual one in our mail. The idea of establishing Interznaniye attracted the attention of readers not only in our country, but also abroad.

A foundation, as is known, begins with the first brick. The formation with western firms of joint ventures, which are interested in the development of mutually advantageous cooperation on a commercial basis, was the first step in the direction of Interznaniye. One of the main tasks of the new joint ventures is the promotion of the advancement of precisely an intellectual product and the cooperation of scientific and production forces on an international basis.

In spite of the short time of their existence—the first joint ventures appeared in the summer and fall of last year—they already have to their credit quite a number of interesting, promising developments. Incidentally, it is better to find out about this, as they say, firsthand. That is why we have invited today to the pages of NTR managers of the joint ventures and other organizations, which have appeared under the roof of the Society for Knowledge. They should also become the basis of the international association.

The International Computer Club

An international nongovernmental public organization.

The founders: the USSR Academy of Sciences and other Soviet organizations, as well as the firms Opus (England), SDS (France), American Ansat (the United States), and other foreign partners.

The activity and plans of the International Computer Club have already been covered quite extensively on the pages of the bulletin (see NTR, Nos 18, 24, and 24, 1988). From these publications the readers got an idea of the concepts, tasks, and ideology of the club, the essence of which is expressed in its motto: "Information Science in the Service of International Dialog."

"The basic task of the club is to unite the interests of Soviet and foreign organizations and firms in the area of cooperation on a wide range of questions that are connected with the use of information technologies," relates A. Yegorov, general director of the International Computer Club. "But before reporting what is being done in this direction, a few words on the latest club news. On 16 March, the constituent meeting of the scientific council of the International Computer Club was held here. Well-known scientists and specialists became members of it. Academician A.A. Samarskiy was elected chairman.

"The number of members of the International Computer Club has increased to 200 Soviet organizations and foreign firms. Talks on cooperation are being conducted with another two American companies—the well-known Bell Technologies and Data Quest.

"In the practical part of my account I would like to touch upon our current problems. So that the International Computer Club could use promptly and fruitfully the achievements of each club member, it is necessary first of all to unite the computers of all Soviet organizations into a unified information network. It is practically impossible to use the telephone network for this due to the 'overnoisiness' of our telephone lines. But a solution has been found. We are negotiating with the Ansat firm, a member of the International Computer Club, on the established in the club of a satellite telecommunications center on the basis of radio modem technology. Recently such technology was transferred by the Americans to aid Armenia. The Poisk Telecommunications Center, which will unite various computers in the cities that suffered from the earthquake, has been established in Yerevan. The International Computer Club, of course, is opening its own affiliate in the Armenian capital, and its members with the assistance of American partners will actively develop the new technology, working within the framework of the Telehumanism Project.

"But the club also needs an outlet to the international information community. At present a plan of the establishment of a unified telecommunication structure of the club with an outlet to tens of international computer networks, such as Telenet, Source, Weu, UUCP, and others, is being drafted jointly with members of the club—the national center of computer-aided information exchange and the Infotel Cooperative. This will enable access to several million terminals in the most immediate future.

"However, in order to win a place on the world market, for a new commodity, as is known, mass advertising is needed. Therefore, with the assistance of the same firm, Ansat, a joint venture for the publication of journals, bulletins, and an advertising catalog of the International Computer Club is being set up under the club. The designs and products of members of the club will be put together in them. Moreover, only developments, which guarantee the highest world level, will be included in the collections. It is planned to release the first issue of the journal in Russian and English in May-June of this year.

"And, finally, it will be rather interesting for reader to learn that affiliates of the International Computer Club are already being set up in Kiev, Minsk, Tomsk, Novosibirsk, and Kazan."

Inkombank-Interznaniye

A commercial innovation bank. The founders: the All-Union Society for Knowledge, the Main Administration for Science and Technology of the Moscow City Soviet Executive Committee, the Rotor Scientific Production Association (Cherkassy), the Moscow Institute of the National Economy imeni G.V. Plekhanov, the Credit and Finance Institute of USSR Banks. The bank has already begun to finance innovations and has provided 5 innovation processes with credits, another 50 are being examined.

[Answer] This, of course, is not much, V. Vinogradov, director of the bank, said. Given today's volume of our credit operations of approximately 21 million rubles about 250,000 rubles have been invested in innovations. The banking mechanism in our country for the present has not been adjusted at all, and that is why increased circumspection has to be displayed. However, in the future the financing of innovations will be our basic business.

[Question] But how, aside from the financing of innovations, do you differ from ordinary Soviet banks?

[Answer] Our bank was organized after the model of foreign commercial banks, we have commercial payment in full. If we do not earn dividends for our shareholders, do not ensure the covering of our wages with the earned profit, and do not achieve the repayment of credit, we are simply ruined. While state banks have free resources from the state. In any case, even while being on cost accounting, they are not worried about the repayment of invested assets, because they are the state system.

[Question] And what kind of system are you? A cooperative one?

[Answer] No. Individuals are united into a cooperative, while our bank is an association of enterprises and public organizations. In reality, this is a higher level of cooperation—a joint stock enterprise. True. leading staff members of the USSR State Bank and the USSR Ministry of Finance believe otherwise.

[Question] And what do they consider you—a state, joint stock, or cooperative enterprise?

[Answer] None of these. At the beginning of last year the Ministry of Finance released a letter which regulates our activity. There we are called shareholder banks. With respect to us they are attempting to use the term "joint stock" as rarely as possible. Although in reality we are more a "joint stock" enterprise than the ones that exist on the basis of the temporary statute of the Ministry of Finance on the issuing of stocks. In conformity with this statute, the owning of stocks does not make it possible to own a part of the enterprise, while for us the share signifies the owning of the bank in proportion to the share payment. Thus, the All-Union Society for Knowledge, having invested 3 million rubles (given authorized capital stock of 10 million rubles), became the owner of approximately a third of the bank.

We are expanding. The council of the bank, at which we will discuss the question of increasing the authorized capital stock to 50 million rubles—this will enable us to carry out investment operations more extensively—will meet any day now. We are trying to diversify the capital and, therefore, are interested in having as many shareholders—small and large—as possible. We are preparing very actively for currency payments. Thus far our actions in this direction have encountered stubborn resistance, but we are confident that we will acquire the right to currency operations, that is, we will become a bank which combines the comprehensive service of clients—with respect to both currency and ruble payments. This is all the more necessary, because we serve a number of joint ventures (among them are joint ventures of Interznaniye—Face to Face, Mosenico...), for which this would be very convenient.

[Question] And what kind of dividends do you offer today's shareholders?

[Answer] A minimum of 4 percent per annum, but we will decide how it will be received. Usually, according to the experience of foreign banks, during the first years after the derivation of the declared profit they pay dividends at the level of 4-5 percent, while after about 10-15 years this figure increases to 15-17 percent.

Mosenico Invest

A joint Soviet-Swedish venture. The founders: the All-Union Society for Knowledge, the Main Administration of Material and Technical Supply of the Moscow City Soviet Executive Committee, the Swedish Enico firm.

"One of our immediate tasks is participation in the construction of the infrastructure of Interznaniye, the erection of buildings of its joint ventures and firms, as well as the restoration of cultural moments of the center of Moscow," relates V. Pakhmanin, general director of the venture. "We also intend to participate in the restoration of the Polytechnical Museum and in the construction of the international Center of Knowledge.

"An entire group of Yugoslav construction organizations, which are already well known on the Soviet market, is supporting our Mosenico. They participated in the turnkey construction of such centers as Dagomys and hotels of the Inturist system, while are now busy with the construction of a polyclinic of Professor S. Fedorov.

"The terms, which the builders are offering, are most advantageous for Soviet clients. Long-term work on our market enabled the Yugoslavs to adapt to our construction norms and regulations and all-union state standards, to tie their construction materials to Soviet standards, and others. The Yugoslav workers are treating with understanding our, at times complex, daily life, the supply of material and technical resources, and so on. Therefore, it seems to me that success on the Soviet market awaits us.

"We were established less than 2 months ago, but the first contract has already been signed. In it, in fulfilling the wishes of the clients, our services will be paid for with Soviet rubles, although in principle we work for convertible currency. Henceforth we are also willing to cover a portion of the expenses with rubles of clients, although we will all the same require currency for materials that are purchased abroad. True, we are helping the organizer-clients to find this currency—they often do not even know that they have it.

"Of course, we are also faced with problems. The basic obstacle in our work in the constantly changing legislation which regulates the activity of joint ventures in the Soviet Union. Thus, the December (of last year) decree opened the doors wide for foreign capital investments in our economy, while famous Decree No 203, which was issued 2 months later, sharply restricted the possibilities of foreign investors in the USSR. Here the point is not

even that our activity was somehow restricted—for that we also have the brains to find a way out of the situation. But foreign partners do not understand the zigzags of domestic legislation and are beginning to experience a natural distrust of us. It is better to measure twice and cut once and to say that this here is possible, while this here is not than to change the legislation even 5 minutes.

"And, of course," Rakhmanin added, "the questions of providing joint ventures with premises worry us. When you drive about Moscow and see the gaping embrasures of neglected, collapsing buildings, and then address to the Moscow City Soviet the request that it would permit us to repair one of them at our own expense and would lease it for 10-15 years, you come up against a wall of incomprehension, departmental isolation, and, in the final analysis, the fact that the conditions of the work of foreign investors in the USSR for the present are more complicated than in the other socialist countries."

Face to Face

A joint Soviet-West German venture. The founders: the All-Union Society for Knowledge and the West German Glache International KG.

"Our main task," general director V. Sabelkin relates, "is the attraction of intellectual resources for cooperation between East and West, assistance in the search for partners on both sides, and the mutually advantageous exchange of technologies. Our activity is aimed at the introduction of domestic inventions on the basis of the international division of labor with the use of western technologies.

"An integral part of Face to Face is a commercial journal by the same name. On its pages businessmen of East and West will find information useful to themselves and specific assistance in the solution of various problems.

"One of the first actions of Face to Face is the holding during the second half of April jointly with Glache International KG of the Kombitekh-89 International Exhibition. About 60 Soviet organizations, which are interested in establishing joint ventures with western partners, have been invited to participate in it.

"The organization and implementation of mass cultural measures of a commercial advertising nature are envisaged by the charter of our joint venture. That is why the Muzyka-89 International Exhibition now being readied (it will take place in July), along with the display of the latest sound recording and playback equipment, electronic musical instruments, and musical computers, will be accompanied by gala concerts of leading stars of world and domestic variety. These concerts, like the exhibition itself, will take place at the Olympic Complex on Prospekt Mira.

"The range of activity of Face to Face is broad. These are consulting services on marketing and engineering, intermediary services, research and development in the area of foreign economic relations, the printing of illustrated materials, scientific and technical assistance in the designing and construction of various projects, and much else."

Soveyemax

A joint Soviet-Canadian venture. The founders: the All-Union Society for Knowledge, the Canadian Eyemax firm.

"We have to develop in the country a network of audio-visual centers," Soveyemax general director A. Pshirkov says.

"The technology, which is being made available by our Canadian partner, in principle will change the situation for any contingent that has come upon such a center. The situation will differ not only from the ordinary lecture setting, but also from the atmosphere of the movie hall and the video showroom. A hall with 300 seats will turn into an active cognitive zone.

"The 'eyemax' technology makes it possible to involve the viewer in the screen action. This is something more than the effect of being present—due to the creation of the illusion of life within what is happening on the screen. It is a matter of inclusion in the action.

"Directly in the hall this is achieved, for example, by the fact that in front of you there is an unusually large screen—19 meters high and 26 meters wide. The sound accompaniment is furnished with a computer-controlled six-channel sound-reproducing unit. The sound 'maneuvers' over the screen and in the hall—from each specific source (for example, a character who has begun to speak)—and moves along with the picture, increasing, say, as an airplane making a landing comes closer. The use of equipment, which creates in each viewer the sensation that there is no one in the hall except him—he is one on one with what is happening—is also possible. Which, as you understand, creates the conditions for complete concentration.

"Of course, all this requires a unique script, unusual dramatic art, and a nontraditional technique of shooting and photographic equipment. We have already begun the training of specialists who are capable of using the new eyemax and omnimax technology.

"All these new possibilities are also forming an active cognitive sphere at the audio-visual centers of the All-Union Society for Knowledge. And that, for the knowledge of which months and months, say, a semester of lectures, were previously required, will be achieved in one to three 40-minute sessions which are based on our programs.

"I had occasion to be convinced of this myself. In Canada I succeeded in watching at one of the audio-visual centers of Eyemax the ecological film 'The Struggle.' I will not talk about my strongest impression.

"It is not so easy to amaze the American audience. But the Eyemax program 'The Dream Lives' also made a very strong impression on it. It was filmed with allocations of NASA and the aerospace firm of Lockheed. The goal is to revive the interest of the nation in American space programs. The impressive program lived up to the boldest expectations of the clients. Many millions of viewers throughout the world have seen it.

"I believe that a similar task has arisen with no less urgency for our Glavkosmos. I am confident that our joint venture will be entirely capable of developing a competitive program.

"But, it appears, it will not be so easy to show it. For the first audio-visual center in Moscow it is necessary to find a building with a hall about 20 meters high. Such ones exist here, we know every single one of them. However, the capital authorities simply do not understand what another movie theater needs 'such luxury.' But we must not at all build a movie theater, but create something qualitatively different—a catalyst of knowledge!

"Having read this, will they perhaps still help us in the Moscow City Soviet or in other organizations?"

Manager Service

A joint Soviet-Danish venture. The founders: the All-Union Society for Knowledge, the Danish Time Manager International firm, the Dialog Joint Soviet-American Venture.

"Today, when Soviet enterprises are changing over to completely new principles of economic management, it is also necessary to give them new knowledge on the theory and practice of management," general director G. Ozerov believes. "Western experience of work under the conditions of complete independence, when the enterprise itself plans the future, manages resources, and so forth, is very valuable here.

"Such a tool of the organization of work as Time Manager, which was developed by the Danish Time Manager International firm (TMI), has received recognition throughout the world. This is a carefully thought out system of the individual planning of working time. As a result, the goals and the means of their achievement become easy to see and a sense of control over the situation appears.

"Time Manager is a reliable and effective tool in the hands of specialists. But this is only a part of the output of Time Manager International. The main role is being assigned to programs for the training of businessmen who use Time Manager. Our joint venture is also dealing with the dissemination of these programs in the Soviet Union. Last year alone Time Manager courses were conducted for 5,000 Soviet specialists. Today the AvtoVAZ Association and the Kama Motor Vehicle Works are our largest clients. At the Volga Motor Vehicle Works, for example, from the fall of last year through February of this year seven Time Managers courses were conducted for production managers of different ranks. An understanding on the establishment at the Volga Motor Vehicle Works of an affiliate of Manager Service has been reached.

"In the unanimous opinion of the managers of enterprises and organizations, at which Time Manager instruction courses have already been conducted, in the management unit the efficiency and the standards of the organization of production are increasing appreciably, a common technique of personal work is appearing.

"The introduction of an electronic version of Time Manager, which makes it possible to use the personal computer efficiently in the work of a manager, is in our immediate plans."

The House of Soviet-Japanese Friendship and Culture

Established under the All-Union Society for Knowledge.

One of its main tasks is to familiarize our scientists and specialists and the public with everything new and advanced that exists in Japanese science, technology, production organization, and culture.

"The idea of establishing the House of Soviet-Japanese Friendship in our capital found support in the USSR-Japan Society," relates V. Denisov, its chairman. "By a decision of the Moscow City Soviet Executive Committee four houses, which are at the beginning of Prospekt Mira, were turned over to us. We plan to complete in a year their renovation and restoration.

"This friendship society will yield much valuable information and knowledge. We will regularly organize exhibitions and hold lectures. The computer classroom, the video office, the reading room, and the library of Japanese literature will also not be empty. We are organizing for Muscovites courses in Japanese and the art of ikebana. We will open a museum of national applied art and a sports and leisure complex.

"The opening of the House of Soviet-Japanese Friendship and Culture is more proof that today popular diplomacy is gaining more and more recognition in the world. It must be noted that five Houses of Friendship already exist in Japan, for example, on the island of Hokkaido and in Sapporo. True, when the Japanese learned that we are opening a House of Friendship in our capital, they decided that Tokyo should also not lag behind Moscow."

OTEMA

A joint Soviet-Luxembourg venture. The founders: the All-Union Society for Knowledge and the Luxembourg Ench firm.

"The name of our joint venture," relates general director D. Sobolev, "is an abbreviation of the phrase 'Organization, Technology, Marketing.' From the very start OTEMA was contemplated as a foreign trade firm of the All-Union Society for Knowledge. The lending of a commercial nature to the dissemination of knowledge promises, in our view, a dual advantage. First, our country has a large number of inventions, the implementation of which is capable of improving the economic status of the USSR and significantly increasing its prestige. Moreover—and this, in my view, is very important—inventors will have faith that their ideas can be embodied and can be of real benefit. Our task is to completely free our clients from bureaucratic escapades, without which, unfortunately, the life of an inventor is so far impossible.

"In addition to this, the marketing analysis of sales markets and the study of market conditions are in our program. OTEMA is prepared to undertake the implementation of practically any idea and to carry it out comprehensively and universally. We were, for example, the initiators of the establishment of the Sportinvest Voluntary Cost Accounting Society, which will engage in the development of technical types of sports, particularly motorcycle sports for children and youths. The holding of a sports holiday, at which viewers will be able to see motorcycle acrobatics, as well as the performance of stars of Italian and Soviet variety, is planned. This idea found full support in the All-Union Society for the Promotion of the Army, Aviation, and Navy.

"Recently our joint venture was one of the sponsors of the Arktika Scientific Sports Expedition, which is now on the way to the North Pole. The unique thing about this expedition is that it is completely autonomous: provisions are not being dropped to its participants, they are also not availing themselves of any other support on the part of 'the mainland.'

"If we speak about the immediate plans, we intend to engage in production activity in the area of laser technology and medicine."

Intermarketing

An information and consulting association attached to the All-Union Society for Knowledge.

"Our activity is addressed to those, who are interested in organizing direct ties between enterprises and organizations in the USSR and abroad and in setting up joint ventures," says I. Baranov, chairman of the association. "Intermarketing is prepared to help enterprises on a contractual basis to perform all the necessary work turnkey, having carried out if necessary a search for a partner, the drawing up of a feasibility study of possible directions of cooperation, and the preparation of drafts of protocols, agreements, and other necessary documents.

"Intermarketing is capable of providing commercial information subscription service to enterprises, organizations, and cooperatives. On the orders of clients we make special marketing studies of specific commodity markets and evaluate the possibilities of export and import—including in freely convertible currency.

"One of the first, already completed projects of Intermarketing is the development of the mechanism of general and internal leasing cost accounting (leasing relations). Without this stage it is difficult to count on success in organizing foreign economic ties.

"Among our clients are large Soviet industrial, construction, scientific research, sports, and health resort organizations and enterprises, as well as cooperatives.

"We are also making analytical surveys of the trends and prospects of development of the world capitalist market—with regard to the questions of production, consumption, scientific and technical progress, international trade, and prices on the world market.

"Starting in January 1989 Intermarketing jointly with the editorial board of the newspaper LESNAYA PROMYSHLENNOST began to publish "The Commercial Timber Bulletin" (once a month on page 3 of the newspaper). Diverse commercial information, which interests enterprises of the timber industry complex, is published here."

Impulse International

A joint Soviet-Luxembourg venture. The founders: the Impuls Cooperative Design Bureau attached to the Vinnitsa Oblast organization of the Society for Knowledge and the Luxembourg Ench firm.

"The task of Impulse International," relates general director V. Gibayev, "is to promote the more extensive use of the scientific, technical, and production potential of both the member countries of the joint venture and countries of the third world. We are engaging on a mutually advantageous basis in the development and production of various models of personal computers, as well as the warranty and after-warranty service of computer hardware. The preparation of the production base is now being completed, and at the end of April the first personal computers, which have been assembled in Vinnitsa from components that our western partner supplies, should appear. However, this will not be the simply copying of existing foreign models. Our computers are

being produced with allowance made for domestic suggestions, they have been modified in conformity with the scientific approaches which were established when setting up the joint venture.

"The organization of an educational center of Impulse International, where Soviet specialists will familiarize themselves with the peculiarities of the use of computer hardware when solving specific scientific, technical, and engineering problems with respect to various sectors of the national economy, is in the immediate plans. We hope that in May of this year the educational center will admit the first groups of specialists. But the doors of our center will be opened not only for them—both school children and undergraduates will be able to study here. Quite close cooperation has already been established here, for example, with Vinnitsa Polytechnical Institute. We are performing joint work with the Institute of Cybernetics of the Ukrainian SSR Academy of Sciences and with a number of organizations of Moscow, Leningrad, and Novosibirsk. We are actively establishing contacts with Soviet enterprises which have practical suggestions on the output of products that would be in demand on both the domestic and western market.

"Impulse International is also considering the possibility of modernizing the material and technical base of the Society for Knowledge by the development and introduction of fundamentally new audio-visual aids, of which there is such a shortage today in lecturing practice. We are also working on the development of information banks and knowledge bases."

Avtoservis

A joint Soviet-French venture. The founders: the All-Union Society for Knowledge and Gaydamac Communications International.

"Its goal is to provide foreign specialists, who live in Moscow, with motor transport," S. Sosurov, general director of the venture, relates. "For this on the basis of the motor pool of the society we are organizing the rental of Peugeots. To start with it is planned to put into operation 200 cars. Our French partners will purchase them in their homeland, making payment from their portion (which is equal to 49 percent) of the authorized capital stock. Currency is being spent on this, therefore, at least as first it will be possible to rent a car only if it is available.

"We will also perform the repair and maintenance of rental cars on our own. True, the task here in our country has been made somewhat easier. In accordance with the contract with the partners the cars will be replaced annually, that is, we will engage in minor repair and keep track of the overall condition of the cars. While for the increase of the profitability of the repair shop the servicing of vehicles of French firms, which do not belong to our venture, is also planned.

"There has probably arisen for readers the question, where will the cars be sent after a year's operation in Avtoservis? They will be sold. Half of the cars in France, half in our country. Such is the contract with Gaydamac Communications International."

Independent Computer Collective Attracts Prestigious Clients

18140223 Baku BAKINSKIY RABOCHIY in Russian 14 Feb 89 p 2

[Article by AZERINFORM correspondent A. Goldenberg under the rubric "The Heading Is for Computerization": "But Only Six Are on the Staff"]

[Text] **The Computer and Navigation Safety**

The fingers of the operator run smoothly over the keys, and on the green display screen lines of different colors appear. Solid lines, broken lines, now coming together, now scattering in different directions. Gradually they lose their confusion and form into a well-built diagram, a diagram of the regrettably well-known collision of the passenger liner Admiral Nakhimov and the freighter Petr Vasev, which occurred not far from Novorossiysk.

The computer plots on the screen the courses of both vessels, maps out the shoreline, recalls the names of the captains of the ships, and cites the data on the cargo and displacement. The point, at which the red and blue broken lines, which indicate the courses of the ships, intersected—the site of the catastrophe—can be seen well on the diagram.

A card file, which has been compiled from similar materials on accidents and catastrophes, could become a textbook for sailors and help them in ensuring navigation safety.

The Imrad Intersectorial Center, which has been established in Baku and provides enterprises, institutions, and organizations of not only the republic, but also the country with the most diverse services, is inviting sailors to acquire such a card file.

"Accidents on water, as is known, occur not only on seas and oceans, but also on rivers," relates R.G. Kuliyev, director of the center and a specialist in computer technology. "And, in particular, on the Neva, which 10 draw bridges span within Leningrad."

Ramiz Gadzhiyevich shows on the screen of another display a diagram of the ship traffic on this river. The lights of signal lights incessantly come on, the yellow rectangles of the bridges separate and come together, warning signals and inscriptions flash. By using the electronic diagram, it will be significantly easier for the controller to regulate traffic on the animated water artery and to prevent potential accidents.

This work of the Imrad Center is involved in the competition for a traffic control system on the Neva, which was announced by the Northwestern River Shipping Company (Leningrad).

For Astronomers, Physicists, Cardiologists

At first glance it might seem that traffic safety on water routes is the only specialization of the center. But this is not so. In accordance with an order of the Shemakha Astrophysics Observatory its staff members designed and produced a special cooler with an automatic control system for an instrument installed on the telescope, as well as a package of programs for the computer processing of the results of observations. A desktop recorder of the physiological parameters of the heart, which surpasses, in the opinion of specialists, analogous foreign models, was produced for the Institute of Cardiology. A unit of original design for the study of the superconductivity of materials, which was also developed by the center at the world level, is operating successfully at the Institute of Physics of the republic Academy of Sciences. Interesting orders are being filled for the Scientific Production Association of Space Research, the Petroleum and Gas Production Administration imeni XXII syezda KPSS, and other organizations.

When you become familiar with what has been done by the collective in a year, the impression is created that you are dealing with a large organization that has its own design bureau and a powerful technical base. However, for the present only six people are on the staff of the Imrad Center.

How are they coping with such an amount of work?

If some technical problem, which requires solution, arises, an order appears, or a contract is concluded, the center brings together the best specialist from throughout the city and not only the city. A cyberneticist, an industrial designer, an optician, a chemist, or a machine builder can be brought in from Moscow and Leningrad, Kiev and Riga, Sverdlovsk and Novosibirsk. Remuneration is by agreement, but for the end result. Moreover, if a development is completed at the level of the best world models, the reward increases significantly. While the equipment, which is necessary for the fulfillment of the order, is leased from enterprises and scientific research institutes for the time when it is free from basic work.

How to Become a Manager

The scientific and technical activity of the Imrad Center is just one of the types of services that are rendered to clients. The center is also taking upon itself the instruction of personnel for enterprises. In the course of a month they taught a group of young specialists from Neftyanyye Kamni the principles of invention and work on computers and confided to them the secrets of cost accounting and the latest achievements of science and technology in the area of petroleum production. Scientists and prominent specialists delivered lectures to them. Courses in the study of the basics of programming were organized for instructors of the secondary schools of Oktyabrskiy Rayon of Baku.

Courses of intensive instruction in conversational English and a school of managers, for which the acceptance of applications from enterprises has already begun, are next. Business games, including computer business games, have been included in the program of its lessons. While specialists from a number of cities of the country are being brought in to deliver lectures.

The Imrad Center is a state cost accounting enterprise of the new type, which operates on the principle of self-financing. They receive what they earn. Inasmuch as everyone started from zero, they did not receive a wage during the first 4 months. But now the small collective is paying completely for itself and is yielding a profit. Of it, 27 percent is deducted for the city fund of the creative scientific and technical work of youth, 3 percent is deducted for the All-Union Fund, while the remaining assets are for wages, bonuses, and the development of the center. The director establishes the salaries for staff members, while the collective establishes the amount of the bonuses, subject to the coefficient of labor participation of each person.

If a Foreign Partner Will Be Needed

Foreign economic services to clients is now becoming an important type of activity of the enterprise. The first orders for product advertisement abroad and for the search for foreign partners have been received. The first contacts have been established with representatives of a number of firms of the United States, Canada, Argentina, and Brazil and with trade representations of foreign firms in Moscow. The conditions of the international market are being carefully studied and consultations on this are being organized for enterprises of the republic.

The Imrad Center will begin to represent the interests of clients in Moscow, for which it is opening its own representation in Moscow. An analogous center in Leningrad is next.

The account about this unusual enterprise would probably incomplete, if one detail of no small importance, in the opinion of the author, were not cited. The computer room, with a report from which this release begins, is located in...a room of the Azerbaydzhan Hotel. The staff members of the center are stationed in two other rooms of the hotel. Indeed, again there is the problem of premises, which has already become persistent. After a long search they were finally found and are suitable. Now it is a matter of capital repair.

A Computer Club Is Needed

For the present there are also no premises for the city computer club, which the Imrad Center, which has set itself the goal to actively participate in the computerization of the republic, plans to organize. Incidentally, it is a matter here not only of premises, but also of computers, of which the center itself also does not have enough. There are already active members of the club, its tasks are being formulated.

The problems, to which the center has devoted itself to solving, are of great importance for scientific and technical progress in the republic.

S&T Journal Publishing Policies Discussed

18140221 Moscow IZOBRETATEL I RATSIONALIZATOR in Russian
No 3, Mar 89 pp 16-17, 24

[Article by Candidate of Philosophical Sciences Yu. Orfeyev, commentary by Doctor of Biological Sciences A. A. Neyfakh, chief scientific associate of the Institute of Developmental Biology of the USSR Academy of Sciences, under the rubric "The Rostrum": ""One's Own' and 'Not One's Own'"]

[Text] [Boxed item: The opinion of Soviet scientologists, which is causing alarm: our leading scientific journals publish one-fourth to one-third as many articles as similar journals of the United States; moreover, that, on the contrary, there are twofold more scientific associates in the USSR.]

According to the published data of Soviet scientologist S. Khaytun, about 12,000 scientific journals are published in the United States, that is, there is 1 journal per approximately 60 scientists. In the USSR there are approximately one-eighth as many scientific journals—about 1,500. We have 1 journal per 1,000 scientists. Thus, if we believe that our scientists are just as fruitful as U.S. scientists, we should have not 1,500, but 24,000 journals. We obviously have insufficient scientific and popular science journals, and that is why only incontrovertible articles, which in one form or another conform to the aims and likings of executives from science, are published in them. At the same time articles, which contain fundamentally new ideas or alternative points of view, accumulate in journal archives. Apparently, every journal should publish five times a year (even in the smallest print) a summary of rejected articles. Now the groundless refusal to publish an article, as a rule, is not liable to appeal. It would not be out of place to publish from time to time brief reviews of rejected articles (incidentally, IZOBRETATEL I RATSIONALIZATOR has such experience).

[Boxed item: The obvious disparity between the range of scientific journals and the scientific potential of our society is hindering substantially the development of criticism and debates in science.]

The very range of popular science and general scientific journals of England alone, not to mention the United States, is far more impressive than in the USSR. Here the most important English general scientific journals (NATURE, NEW SCIENTIST, and so forth) in contrast to our monthlies are weeklies. The question of turning our monthly journals into weeklies became urgent long ago: now rapid information is extremely necessary in science. But in popular journals, for example, a minimum of 3, and usually 7-8 months pass between the delivery of the manuscript by the author and its publication.

[Boxed item: The question of scientific works of the union academies, which are published in the languages of the union republics, merits attention.]

Articles on physics, biology, or, say, mechanics in Georgian or Armenian have a very limited group of readers. We will be realists: scientists are now too busy to study specially the language of one union republic or another (even for the sake of reading "The Knight-Errant in a Tiger Skin" in the original). It is a difficult matter to turn to a translator. And in the indexes of citation you will not find references to works of the union academies. It seems to us that it would be wise for the academies of sciences of the union republics to publish their works in English or Russian. Only then will these works influence science in good time. In turn, this will promote the creative growth of authors and their greater responsibility for the quality of published works.

[Boxed item: Scientific research institutes, higher educational institutions, and universities issue their own collections, transactions, notes, and reports, in which they publish their own associates. The quality of a scientific work, which is submitted for publication, is determined mainly in secret, on an amicable informal basis, without competent editing, and that is why departmental publications breed mediocrity and decrease the quality of published works.]

It is necessary to close down such publications and to establish such scientific and technical journals, in which the works of scientific associates and instructors would be published regardless of their departmental affiliation. This will increase substantially the quality of published scientific works. Several major universities—Moscow and Leningrad—publish their own scientific works. And it is possible to increase even their comparatively high quality, if not a narrow group of instructors and associates of one university or another, but any scientific associate and instructor, regardless of his place of work, would publish works in these publications, provided that the article is of great scientific value.

The domination in the editorial offices of scientific journals of orthodoxy, its elite clan nature, and the opportunity to skillfully "block" any article, having sent

it for opinions to "its own people," the reviewers, create insurmountable obstacles to the publication of new, alternative ideas and works.

[Boxed item: In science there is no glasnost, many believe. Science has become stale.]

This complicates the already difficult struggle of the innovator in science and technology and has the result that scientific associates and specialists, in defending their own point of view, appeal even to the Central Committee and the KGB. Here they are forgetting that the scientific truth is beyond the competence of party and state organs, which should merely ensure the objective conscientious evaluation of scientific ideas and theories and equal opportunities in the competition of scientific studies and developments.

The question of changing the very procedural norms of the acceptance or rejection of scientific works by the editorial boards of journals has been repeatedly raised in the press. The practice of anonymous reviewing has been criticized especially sharply. Would the article of A. Einstein, which for the first time described the theory of relativity, be published in our country? I have strong doubts.

It is well known that the mutual evaluation of works by specialists is very subjective, the position of the scientist in the scientific hierarchy and his having academic regalia have an enormous influence on it. I will cite an exclusively personal example. After graduating from the university in the 1950's I had occasion to study the tactics of the hunt of submarines for surface ships. Quite by chance I read in a biological journal that ecologists did not have a theory which explains the adaptive nature of the herd behavior of animals. In 1-2 seconds this theory flashed in my subconscious. I experienced a unique sense of "insight"—a dawning. My theory (without going into details) reduced to the fact that herd behavior reduces in the statistical mean the encounter with hunters. After a month I sent the head of the report to Leningrad for the forthcoming conference on the use of mathematics in biology. The report was accepted. And here a 22-year-old mathematician, whom no one knows, is addressing a representative forum of scientists. In my heart I expected something like applause from the conference participants. I completed the report, the discussion began. And so what? The speakers had reached an understanding: the mathematicians were trying to prove that my report discredits the use of mathematics in biology, while the biologists were asserting that I do not know biology. And in general, "how could such a report be accepted by the organizing committee?!" I was overwhelmed and did not know how to defend myself. During the intermission one mathematician approached me and said that Professor Lyubishchev wanted to make my acquaintance. "Who is that?" I asked. "A retired professor, from Saratov." I approached Lyubishchev. He smiled at me like a good acquaintance, gave me his address, and asked me to write him. But I did not write.... Not only because the reaction of the hall had forever taken away from me an interest in mathematical biology, but also because "the retired professor from Saratov" had not spoken to me about anything. And only after about 15 years, when I read a story about him by Daniil Granin and his letters, did I become ashamed that I had not written the most honest knight of science. I reproach myself for this to this day.

However, the fate of my theory of herd behavior did not end after its fiasco at the conference. In about 2 years I shook off my inferiority complex and, remembering the inexpressible sense of "insight," which I experienced when the theory as if instantaneously sprung up in my brain, sent a letter to Academician Ivan Ivanovich Shmalgauzen, a prominent evolutionary biologist, with the request to submit it to DOKLADY AN SSSR. In about 5 months I received 10 reprints of my article in DOKLADY. While in about 3 years I read in one book that some young mathematician had proposed a new theory of the origin of herd behavior, moreover, he cited my article in DOKLADY AN SSSR. In about 10 more years a female associate of the Institute of Animal Morphology of the USSR Academy of Sciences, with whom I was acquainted, told me that someone had reported on this theory at an institute seminar. I am recalling all this in order to show: how partially we evaluate the works of each other and how strongly the position of a person in the scientific hierarchy influences the evaluation.

The difficulty of the evaluation of a scientific product is that now there are no direct objective means, by which a person, who is outside the world of science, could check its quality. The evaluation of a work of a scientist should be protected both against ignoramuses and against the egotism of those scientists who long to preserve a monopoly in one field or another of science.

[Boxed item: No small problem is the evaluation of the quality of the scientific product of "big scientists," members of the Academy of Sciences. For such a scientist, as a rule, is protected against any checking in his narrow field, except perhaps the checking of close friends and colleagues.]

When publishing his own research in journals, where he himself is a member of the editorial board, a "big scientist" evades even the minimum checking, which is connected with the opinions of reviewers and which any publications of rank and file scientists should go through without fail. And here the scientific product of scientists, who are vested with power and authority, proves to be beyond criticism and quality control. By using, and more precisely by abusing professional knowledge, it is possible to depict carelessly performed experimental work in the best form; to depict erroneous data by means of the body of mathematics as valuable scientific information, and to disguise incoherent arguments under substantive conclusions. For in recent decades a unique type of scientist, who likes not so much science as himself in

science, has formed. This might be a talented person, but such a scientist is capable of consciously using falsified data, of supporting, if it is advantageous to him, a notorious charlatan, and so forth.

Here is a curious example. The journal KHIMIYA I ZHIZN (No 4, 1972) published the note "A Delicacy Grows in the Vegetable Bed." In it were the following lines: ...As the April issue of the journal (the German title of a nonexisting journal follows—editor's note) for 1972 reports, it has been possible to grow a new variety of cucumbers, which have remarkable taste qualities. By means of the conventional method (transduction through a virus) a set of genes, which is responsible for lactic fermentation, was grafted to an early variety of cucumbers. As a result, with ripening the corresponding biochemical processes began to occur in the fruits. The transplanting of the gene also entailed a side effect: the cell membranes became significantly more permeable for sodium ions. The just ripened fruits have the pronounced taste and aroma of mildly salted cucumbers. The authors of the work hope that they will succeed in intensify the process of drawing off the sodium ions—when it will be possible to gather from the vegetable bed strongly salted cucumbers.

And what of it? A certain world famous scientist quoted in earnest this April Fool's joke in one of his publications. It is impossible to imagine that this person of enormous erudition could not make out the pseudoscientific text. However, inasmuch as this text "poured water" on his mill and in addition worked effectively, he was not about to "find fault."

Of course, the experienced eye of an expert in the majority of cases will distinguish a trivial research subject from a substantive subject. But experts are also people, authorities also directly prevail over them. Alas, how often we are witnesses of the fact that the evaluation of a scientific product is submitted by scientific clans or is connected with one or another informal friendly group.

In the folklore of scientists there is the expression "the Matthew Effect." By this they understand the Gospel saying: "The rich get richer, the poor get poorer." The existing system of the reviewing of articles, which are sent to scientific journals, inevitably gives priority to those, who hold a high position in the scientific hierarchy, and to him, who belongs to an established clan or clique. As a result articles that are not original and are of low quality are freely published. The main thing now when quoting is references to authorities (often inflated ones), who in one form or another control the system of reviewing. They ascribe greater services to scientists, who hold a privileged position in the scientific hierarchy, than to those who have been deprived of these privileges. Events here develop after the pattern of the "Matthew effect," as a result of which false authorities in science appear at one pole, while a kind of "intellectual proletariat," whose scientific services are ascribed to inflated authorities, appears at the opposite pole.

How is one to erect a barrier against such phenomena in science? The rivalry and competitiveness of research are needed, it is necessary to afford all the participants in the research process equal opportunities to publish the results of their research.

There should be introduced in practice the rule that the surnames of the authors become known to the editorial board only after the article has been accepted for publication following the conclusion of the experts. Let not the editorial board of the journal, but other instances, for example, the Higher Certification Commission, form the staff of expert commissions.

It is necessary to expand immediately the range of scientific and popular science journals and to increase the frequency of existing ones. In principle the editorial boards of journals should be formed on the basis of elections through professional societies. The editorial boards should report back to the scientific community.

Indeed, the increase of the range and frequency of journals rests upon paper. "Where is one to get it?" the State Committee for Material and Technical Supply will say. But we also do not have enough paper because we consume it in a barbaric manner. Pointless bureaucratic procedures and inconceivable reporting are eating it up. For example, if when paying for municipal services at the savings bank we were to present not three books, but just one, if when crediting the wage at scientific research institutes and other institutions they were to submit a list, in which there were indicated not all the associates, but only those who for various reasons were not at work, the consumption of paper would be reduced so much that there would be enough of it not only for scientific journals, but also for all writers—past, present, and future.

Everything Is Not So

Doctor of Biological Sciences A.A. Neyfakh, chief scientific associate of the Institute of Developmental Biology of the USSR Academy of Sciences, comments on the article of Yu. Orfeyev "'One's Own' and 'Not One's Own.'"

Why "They" Have More Journals

The comparison made in the article of the number of scientific and popular science journals in our country and in the United States seems illegitimate to me. The point is that in contrast to the USSR such publications in the United States are international—the research of not only American sciences, but also scientists of other countries is represented in them. Moreover, Soviet scientists, as a rule, initially publish their best works in American journals, increasing thereby the significance of

their works. And this is natural, inasmuch as at a number of Soviet academic institutes works, which are published in international journals, receive a higher score (when paying bonuses).

Who Has How Many Scientists

They say: "We have more scientists, they have more science." In our country they also include in this category instructors of higher educational institutions, the majority of whom do not perform scientific work, they add here, say, the associates of agricultural stations, whose work it is possible to call scientific only in case of a fervid imagination. If one regards as scientists only candidates and doctors of sciences (there are approximately 300,000 of them in the USSR), this is less than in the United States. But of the named 300,000 some, after defending their dissertation, transfer to an administrative job, others, after earning a degree, simply "clip coupons," doing routine work, and do not put out information, which it would be possible to consider scientific.

Tolerance Toward People Without Talent Is Excessive

The author asserts that in scientific journals only incontrovertible articles are published. If only that were so! They publish not incontrovertible ones, but weak ones. I take bibliographical articles. Editorial boards are undemanding, they reject less than half and, more often, only a fourth or even an eighth of the offered articles. There is nothing surprising. The scientific level of the people who evaluate articles is often just as low as the level of the authors. In foreign journals (western) the selection is far more strict—here they usually reject three out of four articles that have been sent. In the most authoritative journals, such as NATURE, they publish no more than 15 percent of the manuscripts.

If Only There Were Someone To Restrict!

The opinion about the "restriction" by editorial boards of nontrivial approaches in science is widespread. But my God! The absolute majority of manuscripts testify simply to the low skill of their articles and do not merit publication. I personally know of only one instance, when they did not publish an original idea immediately. It is a question of the so-called Belousov-Zhabotinskiy effect, which is connected with self-adjustment processes.

Indeed, the members of the editorial board can reject in a groundless manner a competent article. What is one to do then? Send it for the verdict of experts? But there are too few skilled scientists to examine all manuscripts scrupulously. There are altogether only a few scientists of the highest skills, and they do not want to divert their attention to read the manuscripts of others.

What It Is Necessary To Fear

And still I am convinced that the potential losses from the nonpublication of manuscripts is far less than from the total publication, the printing of everything in succession. A person with a nonstandard, but fruitful idea in any case will find two or three allies among first-class scientists, even if the idea at first glance is abstruse. One of the examples is Einstein, whose theory of relativity only four or five people initially understood. They also supported him. As for secret reviewing, against which Yu. Orfeyev speaks, it is accepted throughout the world. Such a form of the expression of his opinion frees the reviewer from squabbles and the unnecessary clarification of attitudes. If the author of the article is a specialist in his line, from the review he will be able to "reckon" who wrote it. And it is not that much of a secret here, some well-wisher from the editorial board often suggests the surname of the reviewer to the author.

But mediocre, worthless manuscripts should be categorically rejected. I believe that, for example, the journal ONTOGENEZ (in my specialty) publishes articles, more than half of which are poor.

New 'Language' To Facilitate Technology Assimilation

18010557 Moscow KRASNAYA ZVEZDA in Russian 11 Apr 89 p 2

[Interview with laboratory director V. Surnin by Col N. Kalmykov, correspondent: "Millions of Rubles in Savings"; first paragraph is KRASNAYA ZVEZDA introduction]

[Text] "Millions of rubles in savings may be achieved by switching to a new method of technology assimilation." Such is the belief of V. Surnin, director of the laboratory of technical information and didactics of one of defense industry's scientific-production associations.

KRASNAYA ZVEZDA: Vladimir Ilich, I would like to begin the interview with a letter from Lieutenant Colonel (Reserve) Mikhail Kovlenko, who served over 20 years in the radiotechnical troops. Here is what he writes: "When I began serving, practically all operators could confidently perform the functions of servicing and maintenance specialists as well. They could independently tune a system and seek out and correct a complex fault. Moreover in contrast to today's operators, most of them had not graduated from training subunits. But when I encountered such a thing toward the end of my career, it was an exception. A soldier could only manage to learn to manipulate controls and perform elementary operations tolerably well. The 'guts' of the equipment became something unknown to him. And that's no surprise: The complexity of the equipment has grown several times over, while the methods of its assimilation have remained the same.

"What am I getting at? That each year the gap between the accomplishments of scientific and technical progress and utilization of these accomplishments grows larger and larger. The possibility is not excluded that in the near future technical devices will appear which can be serviced and maintained only by robots or engineers of the highest qualifications. But you can't assign an engineer to each machine, and you can't accumulate that many robots. Then what is the solution? How do we prepare specialists for high-demand occupations?"

Letters with such content are now being encountered with increasing frequency in the editor's mail. Does this mean that a problem does in fact exist here?

V. Surnin: The problem not only exists, but also it can no longer be called a new one: This is not the first year it has been troubling many minds in all countries. Mankind has come face to face with the fact that it is not prepared to fully utilize the possibilities afforded to it by scientific and technical progress, namely due to the low occupational qualifications of service personnel. And the results of this are evident to all: accidents at technical facilities, and thousands and tens of thousands of technical devices of all types—from production lines to machine tools and combines—standing idle due to breakdowns. The most dependable link in the man-machine system is man. The result is tens and hundreds of millions of rubles cast to the winds. Reports have now appeared in the literature indicating that the outlays of labor and assets on technical maintenance and repair of various kinds of machines in the course of their operating life exceed the outlays on their manufacture several times over. Where are things going to go from here?

The main reason for this is that the system for assimilating technical knowledge—the reader is a full 100 percent right in this case—has fallen hopelessly behind progress; for practical purposes it has not undergone any changes. Today it is something cumbersome and ineffective. Why? Because words, text and diagrams remain the principal means of reflecting technical information in this system. But what does it mean to textually reflect, let us say, physical processes occurring in a modern electronic device, and to show the mutual influence and interdependence of all of the highly complex electric connections they contain? How much text, figures and graphs would be required for this? How much time would a person need to learn all of this if modern devices now come with numerous technical descriptions and instructions, and sacks of drawings and diagrams attaining dimensions of several square meters?

This is why there is such an urgent need for creating a new system of reflecting and presenting technical information and for its assimilation by users, based on a fundamentally new method. Here as well specialists involved in this problem are unanimous: The present textual method is simply useless; the most promising way of reflecting information is that of descriptive resources and special symbols—"mental images," which are easily decoded in the individual's consciousness, and perceived as stable signals representing fully defined, specific concepts. Andrnes van Dam [transliteration], one of the leading Western specialists in the field of creating knowledge by computer graphics, feels that one static "picture" could replace a thousand words.

KRASNAYA ZVEZDA: Excuse me, Vladimir Ilich, but it seems to me that that same van Dam also believes something else. Namely that despite numerous attempts, we have still been unable to create a sufficiently effective language making it possible to present a diversity of technical information in the form of pictures.

V. Surnin: This is not quite so. We can assert right now that the language has been created. I am referring to the fragment-pictographic method (the F-P method) of displaying technical information, developed in our laboratory. Last year, by the way, it was registered with the All-Union Scientific Research Institute of Interbranch Information, and thus its practical use has been made mandatory. Though of course only in our defense industry; it has not yet acquired the force of a state standard.

KRASNAYA ZVEZDA: What is the essence of this method?

V. Surnin: To be brief, the method is a system of rules for the formalized use of descriptive resources, and special symbols to present the most varied technical information by means of cumulative, mnemonic and associative means. This is done with the assistance of F-P language. When we developed the method we based ourselves on the idea that man thinks primarily in images, and second that he perceives over 80 percent of information through his visual organs. This means that if we were to present some information graphically in outline form as simplified and stylized images, pictograms and mnemonic symbols, this would significantly simplify and facilitate the process of its perception.

KRASNAYA ZVEZDA: Has this method been practically tested, and what has it revealed?

V. Surnin: It has been tested several times, including in military organizations. All responses are positive. Moreover documents drawn up on the basis of the F-P method are already available for a number of industrial models of complex equipment. And these are the results: Use of the method reduces the volume of technical documents by a factor of three, the time it takes to assimilate the technology decreases significantly, by five times in some cases, the number of mistakes made by technical personnel drops, and it is simpler to find faults. I would like to communicate additionally to specialists involved in discrete mathematics and graph theory that use of the method to develop technical devices permits assessment of the structure of control systems in regard to the possibilities for emergency and dead-end situations. And one other thing: F-P language is universal, and it is compatible with all forms of equipment.

KRASNAYA ZVEZDA: But first the equipment must be assimilated. How much time would it take a person to do so if his knowledge of the technology is extremely limited?

V. Surnin: The technology is sufficiently simple. Experience shows that its assimilation requires not more than 50 hours, and irrespective of the language in which the student speaks at that.

KRASNAYA ZVEZDA: Does this mean that if a secondary school student learns this language in pre-draft training instruction or in an extracurricular program, when he is called up into the army and is given a job as a radio mechanic for example, he would be able to assimilate the complex apparatus?

V. Surnin: He would, and at a minimum of two times faster than his comrades. And much better. On the condition, of course, that he trains with documents written on the basis of the F-P method. And this is true of not just radio mechanics alone. It is true of everyone, irrespective of the particular profile of the individual's specialty—mechanics, electronics and so on.

KRASNAYA ZVEZDA: However, all we can assert right now is the one fact that a new method facilitating assimilation of technology exists.

V. Surnin: Excuse me, but let me emphasize—the assimilation of complex technology. Using this method to teach someone how to use a telephone would be like hunting rabbits with an elephant gun.

KRASNAYA ZVEZDA: All right then, complex technology. But what comes next? How do we put it to practical use, how do we make its use widespread?

V. Surnin: That's the most difficult thing. If we were to consider the big picture, we would need to develop technical documents based on the F-P method and F-P technology on a country-wide scale. This would mean writing a state standard as well. But of course, it would be unimaginable to accomplish all of this in a single swipe. We need time. Obviously the transition would have to carried out continually, like links on a chain—from the developers of the technology, to the enterprise, and then to the sector. This is precisely the way things are already being done in defense industry.

Organizing the mass study of F-P language is a problem of no less complexity. We don't even have the training literature for this yet, after all, except for our own developments, which were written, by the way, in the form of a layman's manual. No publishing houses are interested in it yet. It is, after all, a completely new thing, and the caution of the publishers is entirely natural: Who needs this, and why, would the books sell? Such that we ourselves are forced to supply interested organizations with the necessary literature, printed out on duplicating machines. But could we possibly satisfy everyone in this fashion? The demand for the literature is increasing. Many who are acquainted with the new method are becoming convinced that its use will ultimately mean a significant savings of resources. But of course, we could achieve the maximum economic impact only on the condition that the method is laid at the basis of the entire system of vocational-technical education.

Joint Ventures as Channel for Technology Transfer

18140239 Moscow VNESHNYAYA TORGOVLYA in Russian No 3, Mar 89 pp 48-50

[Article by N. Ryzhkov under the rubric "Information": "Joint Ventures as a Channel of Technology Transfer"]

[Text] A seminar with such a name, which was organized by the Secretariat of UNCTAD jointly with the Chamber of Commerce and Industry and the USSR Ministry of Foreign Economic Relations, was held in Moscow in November 1988. It took place within the framework of the UNCTAD technological program, which includes a number of long-term measures, which are aimed at the improvement of the conditions of international technology transfer, the increase of the technological potential of developing countries, and the study of the effect of changes in technology on the development of the national economy and on international trade.

UNCTAD staff members, representatives of governmental and business circles, experts, and lawyers of more than 20 countries of the world took part in the seminar.

The promotion of a better understanding of the role of joint ventures as one of the most mutually advantageous forms of technology transfer, the study of the practical aspects of their activity in socialist and developing countries, the rendering of assistance to these states in the implementation of steps on the regulation and stimulation of the operation of joint ventures and in the increase of their effectiveness as a channel of the importing of technology, as well as the sharing of opinions and experience with respect to legislation and the system of institutions, which are in charge of questions of the establishment of joint ventures and the pursuit of technological policy in different countries, were the goals of the holding of this representative international conference.

The seminar agenda included such questions as:

— the comparative analysis of national legislations and the experience gained in the area of the importing of technology and the establishment of joint ventures;

— the problems connected with technology transfer by the organization of joint ventures (the determination of the price, confidentiality, the protection of intellectual property);

— the management of the development of technology at joint ventures (the conducting of research and development, patenting, the licensing of technology, product quality control);

— the factors, which influence access to technology, and the problems, which arise in connection with taxation, the transfer of profits abroad, and the payment of royalties, as well as their influence on the process of technology transfer, were included on the agenda of the seminar.

As was indicated by UNCTAD Under-Secretary-General I. Bertholot, the name of the seminar reflected the interconnection of two very important problems of modern international cooperation. Joint ventures are a quite flexible, although complex tool of such cooperation, which is an important independent area of study. However, the development of science and technology in the 1980's is leading to rapid changes of the priorities of national development and the spheres and directions of international relations, which is resulting in the need for the formulation of the corresponding policy, which takes into account the trends both in the development of technology and in the area of the improvement of the forms of cooperation between countries and individual firms.

The spread of microelectronics and information science is having an enormous influence on the economic and social development of individual countries. The results of the introduction in practical activity of genetic engineering, electronic optics, and new materials are becoming more and more perceptible, which is also causing changes in the sphere of international trade. In particular, the possibilities of transferring new scientific and technical knowledge have increased to a significant extent. This is posing for national governments the problem of the protection of this knowledge and the revision of patent systems. Steps on the improvement of the conditions of independent technological development are being taken in various countries. On the international level within the framework of the Uruguay Round of Talks (along the lines of GATT) the discussion of various aspects of the transfer of services and investments is under way, while the system of the protection of intellectual property in connection with the appearance of new technologies is being improved. According to UNCTAD studies, the flow of technology to developing countries, which actively increased during the 1960's and 1970's, during the 1980's declined appreciably in connection with the enormous increase of debt, the slowing of the pace of the economic development of these countries, and several other factors. At the same time the technology markets became more diversified and more open in connection with the increase of the number of sources and forms of technology transfer, which increased the possibility of access of the firms of many countries to the latest scientific and technical achievements. The trend toward the use of forms of cooperation, which are not connected with the acquisition of the capital of a new enterprise or the small share of involvement of the donor firm in this capital, began to appear more clearly. Joint ventures, in the form in which they exist in the majority of countries that are pursuing a goal-oriented technological policy, to a significant degree correspond to the new trends.

The report on the experience in the establishment of joint ventures on the territory of the People's Republic of China and in the implementation of the corresponding steps of state regulation evoked particular interest at the seminar.

The successes of this country in the drafting of legislative statutes in the area of the protection of inventions were also noted. In particular, it was noted by American lawyers that the Law on Patents, which was passed in China in 1985, is a thoroughly studied set of steps of state regulation, which with respect to a number of aspects is a more progressive document than the patent law presently in effect in the United States.

The representative of South Korea covered extensively the questions of foreign investments, the importing and exporting of technology, and the assimilation and development of the latest equipment and technology and described the situation in the economy.

In particular, it was indicated that now about 80 percent of all the sectors of the South Korean economy are open for capital investments of foreign organizations and firms, while the accumulated amount of foreign investments, mainly in the form of joint ventures, by the end of 1987 came to nearly 4.7 billion American dollars.

The report on the experience of the establishment and operation of joint ventures, the combination of various forms of the importing of technology, as well as the drafting of the corresponding legislation in India, the Philippines, Peru, Malaysia, Nigeria, and several other countries evoked much interest of the seminar participants.

Attention was also directed to the fact that this seminar had been organized not by chance in the Soviet Union, where at present active work is being performed on the devising and improvement of standard documents which settle questions of the organization of joint ventures.

More than 200 joint ventures with the participation of foreign partners are already registered in the USSR. For the present these are mainly small and medium ones, many of which are of an information and consultative nature. However, at present talks are being conducted and a significant number of new, quite important projects are at the stage of consideration. The obtaining from abroad of new technology and management know-how, as well as the assimilation and more efficient use of the latest Soviet developments, which are available in various sectors of the national economy, and the expansion on this basis of exports from the Soviet Union are the goals of the organization of joint ventures. The possibility of obtaining access to the capacious Soviet market and, to a certain extent, to Soviet technology is attracting foreign partners.

The seminar participants noted that the possibilities of the transfer abroad of the profit derived by foreign participants, as well as its accumulation in a ruble account in the USSR for the making by this partner of additional investments are causing some problems. The system of the protection of intellectual property in the USSR also requires substantial revision. Many similar questions were raised by foreign participants, but at the same time possible means of their settlement were also proposed. In particular, it was proposed to establish a kind of financial consortium, which simultaneously unites several joint ventures for the purpose of overcoming the arising problems of the receipt, spending, and transfer abroad of freely convertible currency; here some joint ventures will export their output in full or in part, while others will direct attention to the USSR domestic market.

On the Soviet side explanations of several provisions of the corresponding standard documents were given, the possibilities of the practical overcoming of the problems arising for a foreign participant, including those connected with the monetary and financial aspects of activity, were examined, and assessments of the possible directions of the further improvement of state steps of the regulation of relations in this sphere of cooperation were given.

The experience of the drafting of legislation on joint ventures, which exists in the socialist countries, can given the USSR much assistance. As is known, to date the majority of socialist countries have already adopted the corresponding laws and decrees—Yugoslavia (1968), Hungary (1970), Romania (1972), Vietnam (1977), China and Poland (1979), Bulgaria (1980), Cuba (1982), the Democratic People's Republic of Korea (1984), the Soviet Union (1987), and, not that long ago, Laos. And thus far the corresponding regulatory documents have not yet been adopted only in the CSSR, the GDR, and Albania.

Thus, considerable experience in the drafting and checking in practice of various kinds of statutes and enforceable enactments, which regulate and stimulate cooperation in the form of joint ventures, has already been gained in the socialist countries. In connection with this particular interest was displayed in the materials made available by the seminar participants from Yugoslavia and the Polish People's Republic.

As a whole at the seminar many problems of the cooperation of Soviet and foreign firms in the establishment of joint ventures and in technology transfer were covered and the possible directions of their solution were specified, which contributed to the better understanding of the goals and tasks of the partners in the development of mutually advantageous cooperation.

Experts Discuss Computer Literacy In Azerbaijan

18310024a Baku KOMMUNIST in Azeri 17 Feb 89 p 3

[Interview with Professor Farhad Taghyyev of Azerbaijan State University and Urfat Nuriyev, department chief at the Cybernetics Institute of the AzSSR Academy of Sciences: "The Only Way Out"; first paragraph is KOMMUNIST introduction]

[Text] As is known, a general state program for the creation and effective use of computer technology and automated systems was adopted by the CC CPSU and the USSR Council of Ministers at the beginning of 1985. In order to fulfill the allround plan, the effort to turn our republic into a research center was approved. There is no doubt that the solution of such broad and global questions depends on solving many problems. The participants in our talk - Professor Farhad Taghyyev of the S. M. Kirov Azerbaijan State University and Urfat Nuriyev, department chief at the Cybernetics Institute of the AzSSR Academy of Sciences and candidate in physics and mathematical sciences - talked about this.

KOMMUNIST: Certainly computerization arose out of natural necessity.

F. Taghyyev: Great turning points and revolutionary changes in science and technology raised the question whether mental labor could be made easier. The discovery of the computer, which advanced the level of scientific reseach of the time, made it possible to answer this question positively. The situation had already emerged that solving a number questions in economics and science without a computer (i.e., the calculations in atomic energy and space flight) had become impossible. Now one of the questions which establish preconditions for scientific and technical progress is the computerization of all sectors of activity on a broad scale because managing the flow of information necessary in the administration of public life and systematizing it has turned into a mindboggling job, beyond man's potential.

U. Nuriyev: Performing the major duties connected with computerization is directly dependent on how it is approached and the level of preparedness. One of the basic questions consists of influencing people's mentality and psychology through defined channels and guaranteeing them a multifaceted computer literacy because the computer is a basic tool with a 'right' to exist with us, a channel which will have a broad influence on our way of life. That is to say, we have to do this work now - quickly and qualitatively. Otherwise, a few years from now we will be talking about shortcomings or, even worse, trying to cover over inadequacies.

KOMMUNIST: in which science and technology has been developed to a high level, is so far behind in this?

F. Taghyyev: Innovation has always met with opposition due to definite subjective factors. Obstacles connected with the development of cybernetics also existed among us. They viewed it as bourgeois machinery, an attribuite of an alien ideology, stamped it with inappropriate labels and forbade it. Such thoughts also came to the surface in the period of stagnation. An artifical barrier was put in the way of the advancement of computers with the objective of concealing inflated figures and false slogans. Also, some specialists could not see the conditions under which such electronic equipment would be economically profitable, create a qualititative change or exert an influence on man's health and spiritual development. We were also stalled by the prevalence of the bureaucratic-command method and the inability to act freely without orders from above.

U. Nuriyev:: It is the unanimous opinion of specialists that developed capitalist countries are at least ten years ahead in terms of the technical quality of electronic data processing equipment. In other words, in terms of qualitative and quantitive data we are far behind in many sectors of the economy. Pay attention to one fact: in 1986 60 percent of the general income of the USA fell to the share of industries based on computer technology. The problem is that we are not using existing technology at the necessary level. In order to eliminate this situation and achieve a higher level of economic strength in our country, broadbased social and ideological guarantees for computerization must be created. In our republic a special commission for the implementation of computerization has begun work. Now, without acting hastily or falling into the trap of campaignism but taking the real situation into consideration, the preparation of a plan reflecting national and local characteristics is one of the important duties. Without it, the best goals will stay on paper for a long time.

KOMMUNIST: Recently there have been talks about thinking computers.

F. Taghyyev: The development of human society has shown that the fourth generation of computers is not meeting demands at the necessary level in solving a number of intellectual questions. In some of the developed countries plans for a fifth generation of computers have already been drawn up. Such computers will give a definite answer to the artificial intelligence question (is it possible to create a brain?), will receive voice commands and will enter into a dialog with man. It is interesting that achievements attained by mankind over the last two hundred years in science, technology, literature and the arts will be retained in the memory of machines. It will be possible to retrieve from them any kind of information in a short time. If you want to learn how original or not an article you have written is, a computer will turn into your closest advisor. If you want data about a disease, go ahead; if you want to know if a certain medicine is in the pharmacy, the computer will not deny you help. An experiment was recently conducted with computers: after hearing a concert of music composed by a little known composer and a computer, the audience preferred the latter. In the near future all courses in secondary and higher schools will be taught with the aid

of computers. Computers will teach students more effectively and more patiently, and reveal what they have not mastered. In some countries the first experiments in this sector have given positive results. Thus, computer literacy among future specialists as an important facet of the training of teacher cadres must be guaranteed.

U. Nuriyev:: According to predictions, by the beginning of the 21st century all necessary information will circulate paperfree by means of computers in developed countries. Thus, learning a computer 'language' is absolutely necessary. Programming capability will turn into an element of culture for people of that time.

KOMMUNIST: How do you see the implementation of the computerization program in our republic?

F. Taghyyev: Problems which have accumulated in our economic and social life can only be eliminated by means of computerization. The fact that we have decided to take the first step in this direction is proof that we are setting out responsibly. But, rejoicing at the first step or expecting that everything can be resolved by orders from above can lead to bitter results. We must be more attentive in establishing the material-technical base of computerization along the entire front. By relying more on the support of the union as well as the republic itself, by guaranteeing the manufacuring sections of the Baku radio factory with modern equipment and cadres, by increasing production strength and by building new factories together with foreign companies we can create a turning point in this work. Some facts show that haste inthis sector is more expensive in the long run. For example, the majority of computers brought into the republic at a cost of countless millions of rubles are now unused and in unusable condition. We come across a similar situation in our schools. The doors of information and computer offices are often locked or their strengths are not being completely utilized. Such offices have been turned into demonstration rooms to show guests most of the time. Soon a thousand new computers will be brought into our republic from abroad. We have to use them more effectively. In short, we must do it now so that we do not have to take the medicine later.

U. Nuriyev:: There have always been complaints about the quality of our product. In Japan, there is no economic concept of a waste product, and discussing this can cause amusement. All technical processes in factories are controlled by computer. There robot technology is replacing the worker's manual labor so that he is freed from petty or tiring work. Who knows how many manufacturing institutions there are in our republic with dangerous shops or sections. That is to say, the computer is even more important for us. Along with protecting man's health, it creates the conditions for mental and intellectual development and opens up a wide scope for the effective organization of spare time and raising the intellectual milieu. Thus, we must all be anxious for the development of computer technology and resolving the difficulties connected with it, and the social difficulties must be eliminated through our joint strength.

KOMMUNIST: Naturally it is difficult to guarantee everyone's computer literacy all of a sudden. What do you think should be done first?

F. Taghyyev: First, we should begin with cadre training and from the material- technical base. Unfortunately most of us have acted as if the problem did not exist. True, we began this work under conditions of a shortage of cadres and textbooks in the secondary schools and no equipment. We began, but we fell into formalism from the first step. We ran into situations in which that actual instruction of these skills was being conducted by history teachers or older comrades lacking good training. What can one call this other than irresponsibility? The appropriate organizations must think more seriously about cultivating the cadres who will teach the science most effectively. Gosplan and the Ministry of Education have to reach an agreement on sending graduates specialized in applied mathematics and computer technology to certain rayons of our republic. We can emerge from the situation by creating offices in secondary schools equipped with programmed and nonprogrammed calculators and, if possible, personal computers, and by effectively using the strength of the close to 200 workers in computer centers and engineering- technical workers in the academy institutes in the republic to lecture. Teaching BASIC in all schools of the republic is considered necessary in order not to allow wasting time and misunderstanding. Teaching about computers in kindergarden and elementary school (there is such experience) can yield very good results. For example, organizing certain games would be pedagogically useful. The games, together with developing the habit among children to work with computers and establishing an excellent spirit, would also form the ability to think logically, a necessary quality for the future specialist. There is a great need for the translation of existing literature in Russian and for the preparation of original texztbboks and methodological tools.

U. Nuriyev:: I would say the solution to the question is not that difficult. Normal enthusiasm and interest is necessary so that once familiar with the instructions you could work on personal computers. At this point we would note that the computerization concept could be turned into reality thanks to the emergence of personal computers. The time has come to approach the job in an allround manner, to publish a quarterly journal, and to create the conditions for including propagandistic and popular science articles in the mass media. It is also important to spread the experience of advanced schools, hold olympiades and attract the students into a system of interesting incentives. Unfortunately, the level of training of republic higher school graduates in the relevant specialties is low and, due to definite social reasons, technical experts have lost influence so that our students turn to these faculties without enthusiasm. It is amazing

that the number accepted in higher schools in this field has beenreduced and the university's applied mathematics faculty holds one of the last places in terms of its number of students. We must direct the attention of our media to this important field. The book 'Elements of programming in BASIC' which members of the Cybernetics Institute prepared a number of years ago has still not been sent to the Maarif publishers by the Ministry of Education. They call this a cool relationship to an important job. It would also be to the point to create scientific centers for studying automated teaching systems in Azeri and directions in the computerization of new instructional technology.

KOMMUNIST: on many problems and difficulties...

F. Taghyyev: Certainly there have been successes. We have to disseminate the experience gained even further and give the work a broader scope. We must avoid making the mistakes of the past in a new form and under new conditions. Now students in a number of faculties of Azerbaijan State University are being taught machine language and they are becoming used to writing programs competently. Enterprise accounting work is being done in the computer center and in the cooperative under its aegis. Department branches are being created in certain places. The translation of the book 'The microcalculator for students' will soon see the light of day. Computer cooperatives are not doing little work; they have to broaden their networks.

U. Nuriyev:: Early on our institute established a council for Oktyabr Rayon schools in order to guarantee a high level of instruction in the relevant departments. It conducts systematic, goal-oriented work with teachers and students, and the corresponding lectures are given at the institute. The evening and correspondence 'Young Cyberneticists' group founded under the aegis of the institute in 1984 has played a major role in nourishing the computer literacy of teenagers and in their learning the mysteries of the computer. Our colleagues regularly give lectures in teaching centers and production collectives, provide practical help, and lead programmer groups at the young technologists station and pioneer houses. All this is a definite part of the work that has been done...

KOMMUNIST: and complicated, but none of us can stand outside this process becuase in the information age computers will be doing most of the work is economic and social life. No matter what, there is no road back.

Restructuring of Computer Education in AzSSR Urged

18310023f [Editorial Report] Baku KOMMUNIST in Azeri on 15 February 1989 on pages 2-3 carries a 2,600 word article by Jalal Allahverdiyev, prorector of the S. M. Kirov Azerbaijan State University, headlined "On an Invention that Characterizes Science" on the evolution of the computer from the earliest times and the current situation in the Azerbaijan SSR. He points out that "there are no instructional materials in the Azeri language. The time has come for the publication of a popular scientific journal in the information sector"; he adds that "a scientific center must be established to study computer technology and create and disseminate new systems." He claims that there are "serious shortcomings" in the republic higher schools which train computer specialists because the level of training is "often low" as the result of a "poor technical base." In this context he urges a reorganization in the educational system which would create special faculties for the specialized computer training of control system specialists, economists, sociologists, geologists, philologists, and others. He also notes that "our republic manufactures 'Korvet' school computers. Despite a number of positive sides of these computers, they are lagging significantly behind world standards. At first it would be relevant to buy technology abroad."

Goals Of AzSSR Computerization Commission Highlighted

18310021e [Editorial Report] Baku KOMMUNIST in Azeri on 27 January 1989 on page 1 carries a 700 word Azerinform report headlined "Computerization is the foundation of scientific-technical progress" on ramifications of the "allround program for computerization", the goal of which is "to turn the republic into a high-tech region." A "special commission" for computerization has already started work; it is headed by R. A. Huseynov, chairman of the AzSSR State Committee for Material-Technical Supplies, whose deputies include R. A. Aliyev, director of the Ideology Department of the CC AzCP, and H. K. Kasparov, world chess champion. The primary problems faced by the commission are financing, material support and preparation of cadres. In an interview [KOMMUNIST 26 January 1989 page 1 (1600 words)], Harry Kasparov noted that "if we invite competent specialists and teachers from abroad, we would increase the renown of our institutes and gradually raise the level of instruction in higher schools." He adds "technicolor educational films demonstrating the broad range of possibilities for computers must be shown on television." In addition, he urges that since "computer literature is published throughout the world in English, we must succeed in learning this language more deeply in the republic." At a meeting of the computerization commission [KOMMUNIST 28 January 1989 page 2 (700 words)], N. Barski reported that meeting participants decided that "we must send the most promising students from among the higher school cadres abroad to study, invite prominent Soviet and foreign experts to lecture, and create appropriate conditions for youth inclined toward and able to work with computers."

Problems in Kirghiz Academy of Sciences

18140240 Frunze SOVETSKAYA KIRGIZIYA in Russian 29 Mar 89 p 1

[Article (KIRTAG): "Science of Kirghizia: The Choice of Priorities. The Session of the Annual General Assembly of the Kirghiz SSR Academy of Sciences"; first paragraph is SOVETSKAYA KIRGIZIYA introduction]

[Text] As has already been reported, the General Assembly of the Kirghiz SSR Academy of Sciences took place

on 27 March in Frunze. Academician N.P. Laverov, president of the republic Academy of Sciences and vice president of the USSR Academy of Sciences, delivered the report on the work of the Presidium of the Kirghiz SSR Academy of Sciences during the period under review. He gave a description of the process of modernization, which is under way in scientific collectives, and analyzed the progress of restructuring in the main directions of scientific research.

At the 18th Kirghiz CP Congress, the speaker noted, the activity of institutions of the academy was seriously criticized. Serious shortcomings and oversights occurred in the organization of scientific research and in the introduction of the results of scientific development in production. The major miscalculations in the selection and placement of personnel and in the training and education of the young scientific generation were noted. The work on the material and technical supply of scientific institutions and on their provision with instruments and computer hardware was neglected; there was no pilot experimental base. In practice the social sphere was not developed.

In order to overcome these negative trends, the presidium of the academy and the party committee formulated the Concept of the Development of the Academy Under the Conditions of Restructuring for the Period to 1995. The program, which was endorsed by the scientific community, envisages the bringing of science closer to the needs of the republic, the development of basic research in the priority directions of scientific and technical progress, and the speeding up of the introduction of the results of basic and applied scientific research work in the practice of the national economy. Steps on the intensification of scientific research, the establishment of regional scientific centers, as well as the basic directions of the social development of the collective of the academy are envisaged.

The plan of the development of the productive forces of the republic for the period to 2005 was made the basis for the planning of the scientific research work of the academy. The scientific research is closely linked with the formulated concepts and programs of the development of the mining and power complexes of the republic, resource conservation, sheep breeding, and ecology.

The questions of increasing the effectiveness of scientific developments that are being introduced in production were a subject of special attention of the presidium. During 1987-1988 more than 300 proposals of academic institutions, the economic impact from the introduction of which in 1987 came to 12.7 million rubles and in 1988 to 16 million rubles, were introduced jointly with ministries and departments. For the first time in the history of the Kirghiz SSR Academy of Sciences the outlays earmarked by the state for scientific research were exceeded by the derived economic impact.

In speaking about the problems of training scientific personnel, the speaker noted some changes in the training of young scientists in the priority directions of science. The integration of academic and VUZ [Higher Educational Institution] science is being developed.

The president grouped with the substantial shortcomings of the activity of the presidium of the academy the inadequate scientific support of the national economic complex of the republic. The settlement of key questions, which are connected with the restructuring of the planning and financing of priority scientific directions and their material, technical, and manpower supply, is proceeding with difficulty. The principles and mechanisms of the coordination of research work in the republic have been poorly developed. The manifestations of formalism during the changeover of scientific institutions to the new conditions of financing and economic management are causing particular anxiety.

Academician Secretary and Corresponding Member of the Kirghiz SSR Academy of Sciences T.K. Koychuyev covered in his report the basic results of the scientific research activity of the Social Sciences Department, Academician Secretary and Academician of the Kirghiz SSR Academy of Sciences P.I. Chalov—the Physical, Technical, and Mathematical Sciences Department, Academician Secretary and Academician of the Kirghiz SSR Academy of Sciences and the All-Union Academy of Agricultural Sciences imeni V.I. Lenin A.M. Mamytov—the Chemical, Technological, and Biological Sciences Department.

Academicians of the Kirghiz SSR Academy of Sciences O.D. Alimov, B.O. Oruzbayeva, M.M. Mirrakhimov, U.A. Asanov, K.Sh. Shatemirov, and A.E. Izmaylov, Corresponding Members of the Kirghiz SSR Academy of Sciences D.A. Akimaliyev and S.V. Bleshinskiy, and Doctor of Technical Sciences Professor A.S. Dzhamanbayev, who spoke during the discussion of the reports, talked about the means of developing Kirghiz science and about its vital problems.

First Secretary of the republic CP Central Committee A.M. Masaliyev addressed the assembly. Restructuring, he noted, is posing the task to bring our society up to a qualitatively new level and to speed up the socioeconomic development of the country. In past years the party and the state have outlined and have been implementing a number of important steps in this direction. The processes of democratization are being expanded and intensified, the approaches to the accomplishment of state and sociopolitical tasks and to educational activity are changing. The just held election of USSR people's deputies took place under the banner of democracy and glasnost and the free and active participation of the people.

In the activity of the republic Academy of Sciences, the speaker continued, positive changes are occurring, tasks have begun to be accomplished more efficiently and on a

larger scale, the contacts of science with the sectors of the national economy, although slowly, still are being strengthened and extended. But this is just the beginning of the large amount of work that has to be accomplished. The major tasks of the Kirghiz SSR Academy of Sciences were spoken about at the 18th Kirghiz CP Congress, at plenums of the Central Committee, and during meetings of scientists with executives of the republic. Whereas previously the work of scientific institutions was evaluated primarily on the negative side, as the speakers at the assembly noted, now the attitude is changing, besides the criticism meant for scientists, real assistance is also being given to them.

The primary and main task of our scientists is active and direct participation in the efficient comprehensive distribution of the productive forces of the republic, in the acceleration of scientific and technical progress, and in the increase of the productivity of national labor. Is it safe to say that this task is being accomplished at the proper level? Of course not.

Here is confirmation of that. The talk about the necessity of changing the republic over to full cost accounting and self-financing has been going on for a long time now. In conformity with the decision of the CPSU Central Committee and the USSR Council of Ministers starting in 1990-1991 all the union republics will begin to work under the new conditions. This is a qualitatively new approach and it is being implemented for the first time in our practice. The matter is an exceptionally important one. In order to ensure normal work under the conditions of independence, cost accounting, and self-financing, the state of the economy has to be raised to a high level, the cultural and educational level of the workers and the mastering by them of economic methods of management—elementary internal cost accounting and various forms of the contract and lease—have to be increased.

For this scientists should closely link their theoretical and scientific developments and ideas with practice and production. Let us state frankly that on this level the scientists of the Academy of Sciences lag behind their colleagues.

Or there is the following question. We often speak about the problems of ecology in the city of Frunze and about the protection of Lake Issyk-Kul and its natural resources. There are enough opinions on this score, but then we do not have thought out, scientifically substantiated proposals, not to mention urgent practical steps. It is easiest of all to argue about changing heat and electric power plants, motor transport, and municipal services over to natural gas, closing some enterprises, not applying mineral fertilizers to fields, and limiting in individual regions the development of the agroindustrial complex.

Party, soviet, and economic organs, of course, bear responsibility for the settlement of all these difficult questions, but the Academy of Sciences and our scientists should not stand aloof.

Today the state of the food supply of the population worries everyone. The March CPSU Central Committee Plenum, which was held a few days ago, defined the new agrarian policy of the party. The task was posed in the next 5-7 years to increase the per capita consumption of food products and on the average for the country to attain rational norms. For our republic, just as several other regions, this task is extremely difficult, since we have fallen far behind the average union level. However, we are obliged to accomplish it. Under the conditions of restructuring this task is becoming more acute, the people are demanding that its accomplishment be expedited.

The difficulty is that the areas of arable lands here remain limited, while the size of the population is constantly increasing. Today about 4.3 million people live in the republic, while there are 1.3 million hectares of arable lands and less than 900,000 hectares of irrigated lands, there is 0.2 hectare of irrigated pastures per inhabitant. In this situation it is difficult to solve the problem without the intensive, scientifically substantiated conducting of agriculture. The agroindustrial complex needs high-yielding strains of cereals, potatoes, vegetables, and other agricultural crops, as well as highly productive species of animals. A new highly efficient and waste-free technology and, what is the primary thing, new production relations are needed.

Serious basic research is needed in the area of interethnic relations. In particular, in the problem of national self-consciousness and its formation and development there is much that has not been clarified.

Now, when national problems have turned out to be at the center of attention of all of society, not historians, philosophers, and representatives of other social science disciplines, but writers, publicists, and journalists are taking the lead in their coverage. The obvious miscalculations in the training of specialists in the area of national relations are showing up in this.

The decree of the Buro of the Central Committee on the development of national-Russian bilingualism was adopted in the fall of last year. While the presidium of the academy is still just thinking of discussing this document in the summer of this year. Is it really possible to solve the most urgent problems with such promptness? But you also raised this important question. Today it is necessary not only to make one's presence known, but also to personally participate in the matter.

The Kirghiz SSR Academy of Sciences is the headquarters of republic science, and we have the right to expect from the collective efficient, aggressive activity. There work within the academy 3,845 people, of them 1,568

are scientific associates. The annual wage fund of the personnel exceeds 6.3 million rubles. This year alone the government has envisaged 2.68 million rubles for the acquisition of equipment and 1.4 million rubles of capital investments in the development of the base. Perhaps, this is not quite enough. But still this amount comes to more than 4 million rubles. We will find assets for science, but it is necessary to be concerned about their yield. It is necessary to organize work so that every institute, every laboratory, and every associate would constantly ask themselves the question: What has been done, what is the benefit from the completion of one job and scientific development or another, what plans and ideas are there for the future? It is necessary to make the results of the work of scientists public, so that people would know the contribution of everyone.

Unfortunately, today it must be noted that thus far individual institutes have not achieved this. Take, for example, the Institute of Seismology. Only after a comprehensive check, which was organized by the USSR Academy of Sciences, did they finally specify and supplement here the program of their scientific research and fill it with a more topical content. One would like to know whether the associates of the institute did not know about this earlier? They did. But, apparently, the inertia of living in the old way, without particular effort gained the upper hand over healthy views of the role and tasks of the institute for our region.

It is possible to address the same remarks to the institutes of mathematics and biochemistry. The Presidium of the Academy of Sciences should return once again to the question of priorities with respect to each scientific subdivision and find its position for both the immediate and the more distant future.

On this level it is necessary to attack more boldly the development and expansion of individual units of our science, the speaker said, to bring it closer to the sites and regions of the use of developments, and to check the results of the introduction of science against the requirements of today.

The republic government supported the initiative of Academician N.P. Laverov on the establishment of the Osh Academic Scientific Center. A decree on the establishment of another center—the Issyk-Kul Center—was recently adopted. The study of the ecological situation in this unique region and the formulation of the corresponding recommendations will be its basic task. It is also necessary to develop further local centers of science.

Small autonomous research organizations and temporary scientific collectives should become widespread at the same time as large institutes and centers. It is also advisable to develop cost accounting centers, which do not have staff research personnel and lease out laboratory premises and equipment. Some tasks of scientific activity can, we believe, be effectively performed by scientific and technical cooperatives.

Meanwhile, neither temporary nor integrated creative youth collectives, nor other types of scientific organizational structures have become widespread at the Academy of Sciences. The presidium of the academy should display more flexibility and initiative in these matters.

It is necessary to seriously consider and take specific steps on the more extensive involvement of promising young people in science. There are many oversights and much formalism here. In 1987, 49 candidate dissertations were defended in the republic, which comes to only 0.2 percent of the total number for the country. This is the next to worst result among the union republics. And not one doctoral dissertation was defended. While this is already the worst result. A turn toward the technical sciences has not yet been made. Suffice it to say that the share of dissertations on these fields of knowledge came in 1987 to only 0.1 percent.

In conclusion the speaker noted that in the activity of the republic academy as a whole positive changes have emerged and there is some progress. This is also a contribution of Academician Nikolay Pavlovich Laverov. A.M. Masaliyev expressed hope that the republic headquarters of science would ensure the acceleration of scientific and technical progress and the development of social relations. The election to the Academy of Sciences lies ahead. It will provide an influx of fresh forces. We believe that the newly elected members of the academy and the new composition of the presidium will promote the increase of the contribution of scientists of the republic to Soviet science.

Problems With Basic Research in Latvia

18140219b Riga SOVETSKAYA MOLODEZH in Russian 18 Feb 89 p 3

[Roundtable conducted by R. Laricheva with leading scientific associates Yevgeniy Kotomin, Linards Skuya, Yuris Purans, leading engineer Sergey Gvozdev, senior scientific associate Uldis Rogulis, and junior scientific associate Vladimir Vishnyakov, of the LGU Institute of Solid-State Physics, on the question: "Are We Needed Today?"]

[Text]

V. Vishnyakov: According to data published in the journal NOVOYE VREMYA, the U.S. spends 20 percent of its national budget on science, but we spend only 5 percent. And, of these expenditures, only 6 percent go to academy science, and 94—to the ministries. Yet, the ministries will never develop basic science.

Ye. Kotomin: The U.S. Department of Defense is obliged simply by regulation to spend a certain percentage precisely on basic science, just as many large higher educational institutions—for example, the Massachusetts Institute of Technology—finance research which at first glance seems far removed from rapid application, even on parapsychology. Many large companies in the U.S.

invite, for large sums of money, Nobel Prize-winners to do the most general basic research, calculating that in time the expenses will be paid back with interest. There are hundreds of such examples in history, and society should realize the role of science in its own development—both technocratic, as well as social. After all, the point is not that we are relatively poor, but that millions are being scattered to the winds, again, not because of a scientific, but an arbitrary method of managing the national economy. Consider the infamous Minvodkhoz. It is no accident that in recent years Soviet scientists have made almost no great discoveries, and also shamefully missed out on a Nobel Prize for high temperature superconductivity.

Yu. Purans: It is well known that the lower the level of a country's economic development, the less it is interested in long-term basic research. On the one hand, under the existing system of hard prices for our industry's new developments, even expenses for applied research are not paid back. The same basic centers for financing science for the sectors which need our basic research—the electronic industry, instrument building, and the space industry—are located beyond the borders of Latvia, which is yet another example of the departmental solution to the development of science.

Ye. Kotomin: At the level of basic ideas, we do not lag behind the world level, but in terms of the level of technical implementation—this is dramatic. Is there a science-intensive industry in the republic? I do not think so. Yet, if this is so, then who needs us here?

They built a plant for robots, but needed nothing from us, or from the republic Academy of Sciences Institute of Physics. Our contacts with the VEF have also turned out to be episodic. They are more concerned with their own narrow production problems. A production association makes a lot of telephones with memory for more than 200 rubles apiece. These cost 5-8 dollars in the West, but if we had no Western goods and internal competition, these would also do. Yet, it is possible to put off developing optical communication lines until the year 2000. In short, the situation is entirely contrary to world practice. In the U.S., not only private companies, but also the federal government, consider the problem of the latest technological development to be central, having organized 14 special research centers for this where scientists from higher educational institutions cooperate with specialists from companies.

S.Gvozdev: Right now, a model for Latvia's economy—what sort it ought to be—is being discussed. Decisions are being made to orient industry toward agricultural production. However, today all countries with a high share of agricultural production have an industry which has achieved a world level. Once again, we are trying to build our own model, which exists nowhere else.

Science has not escaped the deformations which occurred in the country. As everyone knows, the master and the dog are lame in one leg. There is a phrase in one of Zhvanetskiy's miniatures: "If no one needs the outcome, it is hard to make the process thrilling." Therefore, so that science does not halt, there is no need to convince a person: "After 100 years, everyone will value your labor." If these brains are not needed now, they should be exported. Simply provide an opportunity to work in world centers.

L. Skuya: Maybe it would be more advantageous, working abroad, to pay a certain percentage into the country's budget, and be of greater use than beating one's head against a wall here?

Ye. Kotomin: This practice has existed for a long time for scientists, away for several months abroad on trips, and students taking special courses who have traveled abroad on the USSR Goskomobrazovaniye line: they are left with a subsistence wage, and the rest is sent to the embassy. However, the current foreign travel policy obstructs work even under these conditions, although even the Poles and Hungarians have so-called open passports.

V.Vishnyakov: A gigantic gap exists between that which we can do, and that which industry wants from us and can do. It needs new instruments. We know how to do this, and we can consult, but they literally force us to take a wrench and turn the nuts on new equipment. The existing situation is like hammering nails with microscope.

Yu. Purans: I think that there is a certain critical level of development of basic science, below which one must not sink. This is the level, below which scientists and practical workers are isolated and cease to understand what is happening in the development of basic science in the world. This is the level, below which the number of functionaries, who make incompetent decisions on the development of sectors, institutes, departments, laboratories, and individual groups, grows like an avalanche. The USSR Academy of Sciences for pedagogical sciences and the development of our computer engineering, where we may lag forever, are an example of this.

U. Rogulis: It is bad that there is no openness in the financing system, and young scientists suffer most of all: they do not have a broad circle of acquaintances, and therefore it is difficult to obtain financing for their own research.

Yu. Purans: A solution is possible only given a change in the centralized system for financing science. The most diverse independent sources (plant, regional, sectorial, international, etc.) of financing for basic research on a competitive basis should be accessible: beginning with the state financing of large projects and ending with the financing of individual groups of scientists, by independent selection councils with complete glasnost and

democracy. Our institute is compensating as much as possible for the shortcomings in the centralized system of financing. Thus, a group of young scientists received financing for a promising project from the institute's centralized funds.

A competitive system of financing must be introduced. The first attempts are being made in the USSR Academy of Sciences, but there is no question of this in our province for the time being.

Ye. Kotomin: How colossally bureaucratized our lives are! We spend 90 percent of our time not on scientific ideas, but on the official registration of articles and extraction of money. The situation is changing for the worse. Assume that you have concluded a contract and are responsible for its execution. This does not mean at all that you yourself are master: there is a pyramid above you—the laboratory chief, department chief, and board of directors.

L. Skuya: During restructuring, they conceived of a supplement to the act of expert analysis, without which it is impossible to publish the results of work. Now, it is necessary to show that the article does not contain a description of new technology, but if it all the same does contain one, why is it impossible to use this technology abroad? Some official decided that we are creating technology, which no one can achieve.

Ye. Kotomin: How are articles officially registered abroad? Throughout the world, they put them in envelopes and send them. But here, you go to the foreign department of the university, they write a letter to the minister, which the pro-rector signs, and the minister considers the request... No one has changed this, although the procedure for the expert analysis of scientific publications was painstakingly reworked for 2 years. Evidently, this is the restructuring of the departments. I would just like to understand how we can further this restructuring—no one is publicly discussing a law on the state secret. Maybe we should picket the Council of Ministers!

L. Skuya: A world-wide conference on the field in which I work was recently held. I sent a letter to the chairman of the organizational committee with a request to send works to the conference. The reply began with the words: "I just received your letter, but I believe that the date on it is incorrect: it cannot be that a letter took 3 month to come from the USSR."

Ye. Kotomin: That is nothing. I once received a letter from the United States a year late.

L. Skuya: The chairman of the organizational committee wrote: "We can pay for everything for you in Geneva—transportation, housing and food—once you arrive." This invitation took a month and a half, and it was too late to go. The trip would not have cost the country a cent of hard currency, but could have brought in so much very necessary information!

Ye. Kotomin: A typical story. In the West, there are already no telex machines (they finally appeared here last year): there are facsimile machines everywhere—pages of text and drawings are sent along telegraph lines. Neither the university, nor the Academy of Sciences has such equipment. We cannot immediately interact with our colleagues. Throughout the world there are computer networks, in which it is possible to send any scientific information, for example, the results of a night's calculations, instantaneously via electronic mail. Here, this is primarily an ideological problem—you will suddenly start printing anti-Soviet material! So, will we live in the stone age?

V. Vishnyakov: Cadre training is yet another large area for the application of basic science. However, the system of education is structured such that teaching is cut off from basic science. In higher education, they do not teach us to extract the truth.

Ye. Kotomin: There is no real mechanism for replacing backward teachers, who have been on pension for a long time, but are not leaving voluntarily. It is extremely important to attract scientists into teaching, but not very realistic—the hourly wage is miserly. Lectures are often boring and the courses are redundant, but the quality of teaching does not bother anyone.

Yu. Purans: The students are not interested in obtaining lasting knowledge. The system of free education has played its role. However, after all, other systems are possible, for instance, paying for education and credit for education.

V. Vishnyakov: To do this, a person should be confident that he, after graduating from a VUZ, would be able to pay off the credit.

S. Gvozdev: The chain is traced as follows: the economy is stagnant, science is unrelated to industry, the enterprise does not need modern engineers, students are not interested in studying well, but the teacher—teaches.

Ye. Kotomin: In Italy, for example, Fiat generously finances universities, and not because it takes students from them. They simply realize that developing education is advantageous for everyone on the whole, including them.

Yu. Purans: Right now, sponsors are very popular here. Perhaps, in the new model for republic cost-accounting, the possibility will be given for the sponsor enterprise itself to send part of its state tax for developing basic research to a specific institute or laboratory?

Ye. Kotomin: Of course, it will take years of sitting and waiting, while the system changes. It is necessary to stir the activeness of the scientists themselves, which has declined a great deal in the last 20 years. The results of the election of Supreme Soviet candidate deputies from the USSR Academy of Sciences is symptomatic—several mandates were not used at all, and predominantly scientific functionaries were sent, while the socially active ones were left behind! The organization of the union of scientists of Latvia should help people realize that science, not the amount of iron in a tractor, determines the country's future.

Computers To Monitor Moscow Environmental Problems

18140219a Moscow MOSKOVSKAYA PRAVDA in Russian 4 Feb 89 p 1

[Article by B. Shestakov: "Capital Science—For the City"]

[Text] The powerful scientific potential of Moscow is capable of giving a specific and weighty return to the city economy, of serving as grounds for current and long-range plans for the capital's development. However, in fact, the contribution of the numerous academic and sectorial institutes located here in solving important national economic and social tasks is insufficient for the time being.

Ways to accelerate scientific and technical progress and make the greatest detachment of scientists and engineers in the country more active were considered by L.N. Zaykov, Politburo member, CPSU Central Committee secretary, Moscow CPSU Gorkom first secretary, during his visit to a number of the city's scientific centers on 3 February. G.I. Marchuk, USSR Academy of Sciences [AS] president, K.V. Frolov, USSR AS vice-president, V.T. Saykin, Moscow Gorispolkom chairman, and V.K. Belyaninov, Moscow CPSU Gorkom secretary, were with him.

The tasks for creating an automated design system (SAPR) for city-planning and architecture were discussed at the "Mosproyekt-2" Administration of Glavmosarkhitektura. O.M. Belotserkovskiy, director, USSR AS Institute of Design Automation, acquainted the participants in the meeting with the course of scientific developments for applying SAPR in drafting the new general plan for the capital region in the period until the year 2010, for designing new buildings and structures, and for creating an automated enterprise management system. The joint Moscow Gorispolkom and USSR AS "SAPR for City-Planning" Program calls for the creation of a unified computer center and the gradual conversion to automated design for all Glavmosarkhitektura subdivisions.

The use of computers frees architects and city-planners from many labor-intensive operations and helps them make optimum decisions concerning all stages of the production process: design, selection of structures and materials, and effective organization of construction and assembly work.

The use of mathematical methods and computers for evaluating and forecasting the ecological situation in the city, which has important significance from the viewpoint of type-design adjustment for the buildings and structures being designed, as well as for the capital's health care needs, were discussed.

The "Moskva" ASU [Automated Control System] Scientific Production Association is the head organization for creating a complex of interlinked automated systems for managing the municipal economy of Moscow. In this area, the implementation of various projects at a total cost of 18 million rubles is planned for the current year.

During the visit to the NPO [Scientific Production Association], N.A. Kuznetsov, its general director, reported that the "Moskva" ASU NPO includes a main scientific research center for planning and management systems, the "Mossistemtekhnika" Specialized Design and Technological Bureau, and three collective use computer centers (VTsKP).

The activity of the central collective use computer center is a specific example of a successful application of computer equipment for the city's life support. Its basic task is to operate city-wide automated systems, including systems for controlling the registration, distribution, and exchange of housing, for social security, and for the job placement of citizens.

The "Health Care" VTsKP helps to regulate the operation of the ambulance and pharmacy service and the registration of medical cadres, and analyzes the activity of the capital's polyclinics. The "Zelenograd" VTsKP participates in drafting models for managing the economy of the separate rayons of Moscow.

At the "ambulance" center, the automated system for managing this scientific and practical association, which is prepared to offer Muscovites necessary medical aid around the clock, was demonstrated. Thousands of doctors and nurses are equipped with the necessary devices and radio-equipped transport. Last year, they made almost 2.8 million calls.

The station's conversion to work according to a territorial-zone principle has made it possible to substantially increase the timeliness of an "ambulance" brigade's arrival on a call. The introduction of automated processing of call maps, of the inventory-taking and distribution of the hospital bed fund in the city's hospitals, and of management of the medical cadres, has given significant

advantages. However, for the time being the work of the "Ambulance" NPO is far from the tasks posed and evokes the population's justified censure.

L.N. Zaykov met with the party and economic aktiv of the "Moskva" ASU Scientific Production Association. Communists and all working people of the capital have been actively included in the practical implementation of the resolutions of the 19th All-Union Party Conference and the cardinal restructuring of Soviet society. The results of the reporting and election campaign in the city's party organizations, which concluded the 27th Moscow City CPSU Conference, convincingly attested to this. The party's course toward radical renovation and democratization, the expansion of glasnost, and toward radical political and economic reforms is confidently opening the way, and the gigantic creative work which is developing everywhere is beginning to bring tangible results.

An important stage in the political reform is the election campaign now being held for electing the USSR people's deputies. Meetings between the candidate deputies and party organizations and labor collectives have begun. One of these meetings was held yesterday at the capital's Plant imeni Vladimir Ilich, where we visited with N.I. Ryzhkov, CPSU Central Committee Politburo member and USSR Council of Ministers chairman.

The enterprise workers spoke of their decisive support for the CPSU's foreign and domestic policy and of the need to further intensify the revolutionary transformations.

"Being a candidate USSR people's deputy from the Communist Party," the CPSU Central Committee secretary said, "I want to remind you: the party was and remains the motive force of restructuring. Therefore, in Moscow and throughout the country, people are naming, above all, communists as candidates—the confident supporters of renovation who have displayed personal activeness. It is precisely these people, in the first place, who are faced with making the ideas of restructuring a reality, with achieving a positive shift in the life of the Soviet people."

At the meeting, it was noted that the scientists of the capital should significantly step up their activity in the interests of the city. Moscow, as a complex, multifunction national economic complex, should be a testing ground for the development of all novelties in domestic science and engineering. The formation and implementation of "Progress-95," the comprehensive territorial and sectorial program for intensifying Moscow's socioeconomic development, creates necessary prerequisites for this. Its implementation is called upon to eliminate the city's lag in many spheres and to contribute to solving the most important problems of its everyday activity.

Above all, it is necessary to develop the unified general concept of completely automating the management of the city's territories and its 33 rayons, taking sectorial interests into account. Proceeding from this, in the near future responsibilities should be distributed among the scientific organizations, central ministries and departments, and the Moscow gorispolkom and its subdivisions, in order to start the step-by-step creation of a system of interlinked computer complexes, constantly operating, regularly supplemented with information and expanding by way of new subsystems. In this regard, the inseparable connection of the development of the capital and of Moscow Oblast must be taken into consideration.

This work, which is being carried out within the framework of the "Progress-95" Program, serves as a foundation for preparing a similar city program in the 14th 5-year period, and as a model for creating similar systems in other regions of the country.

V.A. Korovin, chief, Moscow CPSU Gorkom Socioeconomic Department; L.V. Vavakin, chief of Glavmosarkhitektura; V.P. Yevtushchenko, chief of the Moscow Gorispolkom Main Administration for Science and Technology; G.I. Kutnyakov, P.A. Klimov, and A.V. Nikonov, CPSU raykom first secretaries, and A.I. Fetisov, A.S. Latushkin, and G.A. Pluzhnikov, rayispolkom chairmen, participated in the consideration of questions.

Poor Results in Turkmen Academy of Sciences

18140225 Moscow IZVESTIYA in Russian
14 Apr 89 p 1

[Article by IZVESTIYA correspondent V. Kuleshov: "In the Republic Governments: Price of an Idea"]

[Text] The Turkmen Council of Ministers has deemed the work of the TuSSR Academy of Sciences Presidium Coordination Council unsatisfactory.

It was strange to hear: republic science only shows a 1 ruble, 20 kopek return on every ruble invested in developing research. Scant indeed! In the first place, it is strange because today Turkmenia has neither many nor few, but about 2,600 doctors and candidates of science. Not every republic can boast of such a scientific community. There are more than 600 of them in the VUZs [Higher Educational Institution] alone, and just as many in the academic institutes. Two academicians, eight doctors and 75 candidates of science are employed in the single "Solntse" Scientific Production Association alone, of which the Solar Energy Institute is a part. Although the outlays here for solving the problems of using solar energy have been about 20 million rubles, to this day the scientific production association has not put a single development into production with some sort of significant economic effect.

"Why?" F. Sultanov, chief scientific secretary, TuSSR Academy of Sciences Presidium, was asked at the republic Council of Ministers meeting.

"We do have developments. There is a program for solar engineering systems, but the lack of an experimental base and of plants does not offer a possibility for applying them," he answered.

[Question] Well, then tell us what kind of help science has given the republic with the problems of using water resources? What has the coordination council done to solve the problems of employing the rapidly increasing labor resources or secondary use of drainage collector water? After all, 7-8 cubic kilometers of water, which could be successfully returned to produce agricultural output, are dumped into the sand annually.

"We are developing a goal-oriented program," was the answer.

"How so?" A. Khodzhamuradov, TuSSR Council of Ministers chairman, spread his hands in puzzlement. "There are ideas, programs are being developed, millions are being spent, but there are no results. And this is with such an army of scientific forces in the republic?!"

This is not the first time this question has been asked, and it is not the first serious discussion about republic science's irresponsibility for the region's fate and its simplistic approaches to solving immediate problems. Indeed, the Turkmen scientists do have many ideas and dissertations—in abundance. Yet, when it is a matter of certain priority directions of scientific activity and of basic research on vitally important problems for the republic, the scientists either alienate themselves or restrict themselves to half-measures. For example: during the entire time of the "Karabogazsulfat" Production Association's existence, local science has not given any specific recommendations whatsoever for preserving and comprehensively utilizing the mineral raw material base for the chemical industry. Furthermore, nothing has been done to create an enterprise on the banks of the Kara-Bogaz-Gol Bay, capable of reprocessing the sea "glop." Similarly, to this day the TuSSR Academy of Sciences does not have an aggressive, efficient position for saving the unique Kara-Bogaz-Gol Bay.

One reason for the poor results of the scientific activity of the republic's scientists, as noted at the TuSSR Council of Ministers meeting, lies in the fact that the Coordination Council does not ensure the consolidation of scientific forces and funds for solving the key problems of developing scientific and technical progress. It was also noted that the proportion of scientific work in VUZs is extremely low.

Petty subjects have become the lot of most of the Turkmen ministerial and departmental scientific research institutions. What can be said of the scientists of the republic Minzdrav or Gosstroy, if the share of basic work in the TuSSR Academy of Sciences itself has decreased from 48 to 33 percent in the last 2 years. The republic government instructed the Coordination Council to develop and submit a new version of the Coordination Council statutes within a month, having obliged its leaders to take steps to make the work of the TuSSR Academy of Sciences Presidium, sections and committees more active in the most important scientific directions, which are of paramount significance for the republic.

Making Economy Receptive to Technological Progress

18200340z PLANOVOYE KHOZYAYSTVO in Russian No 4, Apr 89 pp 22-30

[Article by V. Faltsman, doctor of economic sciences and professor: "Receptivity of the Economy to Scientific-Technical Progress"]

[Text] As scientific-technical progress becomes a most important factor in economic growth and a source of the material well-being of the society, the task of establishing an economic mechanism that strengthens the economy's receptivity to innovations is becoming more and more urgent. This mechanism must encourage enterprises to utilize scientific-technical achievements and contribute to their dissemination in the national economy.

In our view, the following problems are worthy of priority attention:

- the justification of the rational relationship between independence and centralism in the management of scientific-technical progress; between its centralized planning, the theoretical advantages of which have not yet been fully realized, and self-development on the basis of competitiveness in the consumer market;
- the analysis of conflicts in the interaction of productive forces and production relations limiting the spread of progressive procedures and technology and the development of measures to eliminate these conflicts and limitations;
- the establishment of additional motives for the spread of scientific-technical achievements by restoring the link between social and economic objectives and results, on the one hand, and scientific-technical progress as their most important source and generator on the other.

The Possibilities of the Center and the Functions of the Enterprise

The state sytem for management of scientific-technical progress, a system based on the centralized planning mechanism for the directive introduction of innovations, was formed in the country by the mid-1960's. Its core was the planning targets for new equipment and the awarding of bonuses for their fulfillment, which are autonomous from the plans and stimulation of the main work of the enterprise. Specific scientific-technical programs became part of this system somewhat later.

The main role in this system was assigned to the centralized management of the quality of output on the basis of standardization, state certification, price setting and subsequently state acceptance. Standardization and certification are called upon to evaluate through experts the conformity of products to the requirements of the domestic and international markets as well as to the best world and domestic analogues. In accordance with the results of certification, prices are marked up or reduced for quality of output. Price reductions gradually increase in time, which should stimulate the acceleration of the renewal of obsolete items. State acceptance is supposed to help in the production of output without defects, in its conformity to existing standards, and, in the final analysis, in closing the way to substandard products.

Although it had a positive effect on the dissemination of the achievements of science and technology in the national economy, the centralized-planning system of management could not ensure an adequately high level of its receptivity to scientific-technical progress. The input economic mechanism restrained the establishment of resource-saving basic technologies. Quality began to suffer and this was especially noticeable for consumer goods and output in machine building. The country's backwardness in the application of electronics and computer technology became dangerous in scope at the same time that the production of the means of flexible automation (robots, machine tools with numerical program control, etc.) was being forced without considering the conditions for their efficient utilization. As a result, a radical economic reform of the management of scientific-technical progress has become necessary.

The general direction of economic reform is a significant increase in the role of commodity-money relationships in the management of economic processes. With the development of wholesale trade in the means of production, the existing system for the autonomous management of scientific-technical progress must be replaced by a new mechanism for the self-dissemination of innovations that is based on economic competitiveness and competition. And it is very important to establish a rational relationship between centralized and decentralized methods for managing scientific-technical progress, state planning, the indirect regulation of its introduction, and the self-dissemination of innovations. It is determined by the specific nature of branches and production systems, by the peculiarities of technologies and new equipment and by the state of wholesale trade in the means of production.

The possibilities for a centralized influence on the dissemination of the achievements of science and technology are greatest in one-product branches and mass production systems producing standard output with a limited number of quality parameters (electric power, cast iron, coal, motor vehicles, and others). The number of technological procedures in their production is usually not large. In a number of cases here, the centralized mechanism for directly influencing scientific-technical progress made it possible to reach the most advanced frontiers (e.g,. in the use of fuel for the production of 1 kilowatt-hour of electric power and in the utilization of the useful volume of blast furnaces). Thus, the predominant product in the power industry is electric power, which essentially has a single indicator of quality (frequency of current). This indicator is subject to centralized measurement and calculation just as easily as the volumes of production of electric power. The latter is

worked out with the help of a limited set of standard basic technologies and units of different capacity. Hence the possibility of establishing technologically well-founded standards for fuel use per unit of electric power and consequently the centralized regulation of production costs. The branch enterprises are not very interested in increasing production outlays, for this does not lead to a higher price for electric power, at least not before their next general state review.

In the branches for series and especially individual production, with a huge products list and a multiplicity of parameters for quality and conditions for utilization of those products (light industry and a large number of machine building branches, for example), there are minimalpossibilities for a centralized influence on the introduction of the achievements of scientific-technical progress. Here only the consumer can assess quality and that only when there is a choice of suppliers and not always infallibly. In addition, the objectivity of the state certification system, its normalization and standardization are apparently unattainable.

Series and individual production systems are based on a huge diversity of technologies, which complicates the scientific validity of the standards for the expenditures of physical resources and outlays of the enterprise, especially at the branch level. This makes it possible to increase expenditures and subsequently to raise prices for output in the process of its renewal, which is taking place more actively in the group of branches with many products than in those with one product. Along with a direct increase in prices in the branches of this group, it becomes possible to achieve high rates of growth in output in value terms, profit, and all production indicators of efficiency as a result of changes in the products list and the reduction of the share of the output of their relatively inexpensive forms.

The relatively low stability of economic ties that is inherent in branches with a large products list creates the preconditions for such an undesirable development of the enterprise. Under the conditions of shortages and in the process of the consumer's extremely difficult search for suppliers of the new products, this makes real the dictates of the producer in the area of the quality of output, technologies for its production, costs and prices.

The possibilities for the centralized management of scientific-technical progress are reduced due to the fact that enterprises of the multibranch-combine type are predominant in the branches. And this means that up to 40 percent of the production capacities in machine building are in the enterprises of other branches.

Machine building (primarily series, small-series and individual) represents a classical example of production in which a centralized influence on receptivity for scientific-technical progress is ineffective. It is characterized by: an abundance of parameters for the quality of output complicating its comparison and certification; a large products list; a diversity of technologies, which reaches several dozen even at a single enterprise; and complex product and technological cooperation. In this connection in machine building, on the one hand, there are the greatest difficulties for the direct planned management of the introduction of new equipment, progressive products and resource-saving technologies and, on the other hand, the preconditions arose for input management, an increase in production costs and higher prices, making possible the successful resolution of problems in the development of cost accounting without resorting to the resource of scientific-technical progress.

The defects of the weak link between the management of scientific-technical progress and the final economic results of the work of the enterprise, in particular the substitution of the evaluation of the quality of products by consumers through state certification, were fully reflected in machine building. The pressure of the plan on the indicators of scientific-technical progress in the branch merely distorts the statistics, doing little to accelerate real innovative processes.

To raise the quality of machine building output in the current five-year plan, for example, two indicators—the share of products in the highest quality category and an indicator of their renewal—were included for the first time in the plan for new technology. In 1986-1987, this share increased to 49 percent for the most important products of machine building and the relative share of products assimilated for the first time increased from 3 to 9 percent. Is such a jump realistic if the number of machine models built declines for many years and turned out to be fewer in 1987 than in 1985? Is such a high indicator of quality attainable under conditions in which in the studies of machine building research institutes and design bureaus the share of models surpassing existing analogous models is only 7 percent? How can a high self-evaluation of quality be correlated with the increasing pursuit of imported equipment and the insignificant relative share of the sale of Soviet equipment in capitalist markets? The answer to such questions should be sought in the distortion of these indicators caused by the increasing planning pressure on them. The distortion of statistical data merely gives rise to illusions of accelerated scientific-technical progress.

In this way, the centralized planned management of scientific-technical progress turned out to be insufficiently effective for branches and production systems with a large products list, whose output is included in the final product of the national economy. The enterprises of these branches need additional convincing reasons, the hopes for whose appearance are now linked with radical economic reform. At the same time, there is a large group of branches and production systems where the possibilities for a centralized planning influence on the introduction of innovations are far from exhausted. Methods for the centralized management of scientific-technical progress may predominate here. The role of the state in the dissemination of innovations must decline from the

mass production of single products to the series multiple-product production of its type and, in industry, from raw materials branches and branches for the initial processing of raw materials to the production of complex products with extensive diversity of quality and conditions of further utilization.

The rational relationship between centralization and decentralization in the management of scientific-technical progress also depends upon the specific nature of the innovations being disseminated. Thus, progressive basic technologies can be introduced primarily in a decentralized manner on the basis of self-financing. True, for this purpose the prices for raw and other materials must be brought into line with the requirements of scientific-technical progress and such work is now being done. In those cases in which the reform of wholesale prices could not resolve the problem of the cost-accounting utility of resource saving, it is necessary to provide for subsidies from centralized sources.

In contrast to this, the establishment and broad application of new interbranch technologies and fundamentally new generations of equipment, especially in the area of electronics and computer science, require a concentration of means that may exceed the possibilities of individual enterprises and associations and sometimes individual branches. Here the centralized financing of large-scale programs and projects and systems to quarantee the risks of the user is unavoidable; national measures are needed to eliminate the negative consequences of scientific-technical progress. Large-scale scientific-technical measures in the area of ecology, public health and education must be financed from the state budget.

The transition to a qualitatively new relationship between centralism and decentralism in the management of scientific-technical progress does not suggest the immediate elimination of existing methods for its planning. The renewal of the operative system for planning the introduction of new equipment must take place in proportion to the establishment of a consumer market for the means of production accompanied by the abolishment of the centralized formation of stocks in distribution relations and the transition to wholesale trade and the democratization of price setting. It is inadmissible either to delay or to force these measures unjustifiably. But the underestimation of the state regulation of prices under the conditions of monopolization and shortages will lead to the vigorous development of inflation and physical distortions.

Meanwhile, the elimination of the monopolistic position of the producer requires significant resources and time. In particular, state measures to limit such phenomena and to develop economic competitiveness among supply enterprises on the basis of scientific-technical progress may include: the rational breaking down of enterprises to counteract excessive concentration that does not bring about a substantial reduction of costs but is accompanied by the effect of the monopolistic position of the supplier; the establishment of the preconditions for the expansion of the products list rather than the original subject specialization and the conditions for the transfer of capital investments between products and the mobile migration of workers from one area of work to another; promotion of the rapid formation of new small and medium-size enterprises, including cooperative and joint enterprises with foreign firms; and the purchase of competing commodities in world markets for the purpose of economic influence on quality, price and renewability of the analogous output of domestic production.

The results of economic reform are largely determined by the interrelationships of the enterprise with state management authorities—national economic, branch, local and functional. At the same time, the demands in the acceleration of scientific-technical progress on planning, financing, price setting, the remuneration of labor and other directions of the interaction of the enterprise with state authorities are so high that it now appears probable to speak of an adequately lengthy adjustment of the economic mechanism and its restructuring to utilize the resource of scientific-technical progress.

In the first stage of the reform, it is hardly advisable to strive for unification of management methods or for stability of economic standards and their uniformity for different branches. This is proper only for a well-adjusted economic mechanism. In the transition period, there will inevitably be a diversity of management methods and their struggle for survival, variation and differentiation on economic standards, and practical games between state authorities and enterprises, the most important objective of which is the achievement of the highest receptivity to scientific-technical progress and, on this basis, rapid growth of production efficiency.

The development of the principle of decentralization in the management of scientific-technical progress requires an immediate and sharp reduction of the flow of administrative decisions from the top level of management. Thus, the expansion of the self-financing of measures fornew equipment is being checked by the decisions of central authorities made in different years with respect to the financing of above-limit construction projects. In civilian machine building alone, there are almost a thousand such decisions in effect that tie up as much as 80 percent of capital investments for an entire 5-year period in advance.

How to Accelerate Scientific-Technical Progress

The economy is by no means indifferent to innovations. Frequently it actively resists them. The reasons are found in the conflicts in the interaction of productive forces and production relations. Let us examine three conflicts: between quantitative and qualitative orientations for economic growth; between physical and value

(more accurately, price) indicators of development; and between the resource-saving direction of scientific-technical progress and the input nature of the economic mechanism in effect.

The new economic mechanism is called upon to eliminate the conflict between quantitative and qualitative economic growth and to remove those limitations that the pressure of planning indicators for the volumes of production imposes on the dissemination of innovations. A fundamental transformation of the material and technical base of the society on the basis of scientific-technical progress is incompatible with a simultaneous increase in the volumes of the production of output. In the planning area, therefore, the initial requirement on the new economic mechanism is the renunciation of overstrained plans and the elimination of the pressure on the enterprise from volume physical and especially value indicators. Meanwhile, the first steps of reform not only did not reduce the planning pressure on the increase in volume value indicators but even increased it, especially for profit (income). It deprives the enterprise of reserve capacities, time and resources necessary for the assimilation and dissemination of technical innovations. Under these conditions, the labor collective has no possibility of reducing the amount of production of output for the purpose of subsequently improving its quality and reducing the price.

A rational relationship between quantitative and qualitative production indicators cannot be determined and prescribed for the enterprise from above. For this reason, the removal of the unjustified pressure on the amount and rate of growth primarily means granting the enterprise independence in the elaboration and confirmation of production plans. But such a right can be realized only in the event that the state order is issued on a competitive basis.

The independence of the enterprises will temporarily lead, of course, to a reduction of the amount of production. At the same time, however, their funds and wages must be reduced proportionally. In such a situation, a reduction of this kind would not represent a danger. If it were carried out within reasonable limits, on the other hand, it would be an extremely important prerequisite for the normalization of the economy. Above all it would create the conditions for the restoration of physical balance not on the plane of shortages but taking into account the reserves necessary for improvement of the receptivity of production to scientific-technical progress, compensation for the nonfulfillment of plans for the introduction and assimilation of capacities, performance of the basic work and for a number of other unforeseen obligations. The preconditions would arise for eliminating the shortage of mass types of output, raw materials and other materials. Possibilities would open up for the technical reconstruction of branches and the renewal of fixed capital, for the acceleration of the dissemination of resource-saving technologies, and for the elimination of jobs lacking social prestige. Such an acceleration of the renewability of the output of machine building and other processing branches would become realistic and this would lead to a radical increase in its quality and not merely to higher prices. Conditions would arise in production for the elimination of unevenness that leads not only to defects but also to social tension and conflicts in the labor collective.

The priority acceleration of the development of resource-saving innovations will make it possible to reduce not only the rate of growth of the production of physical resources but in a number of cases the absolute amount of the extraction of mineral raw materials as well. Accordingly, there will be a change in the load on metallurgy and the chemical industry. Inasmuch as the raw materials sector of the economy is the most capital-intensive, it becomes possible to diminish the load on the investment complex for bringing construction capacities in line with the planned sphere of construction work and scope of capital investments. The result of this may be a reduction of the duration of construction by a factor of three or four. There will be a reduced load on machine building, in particular through the absolute reduction of the production of tractors, combines, and mining, quarrying and some other of equipment. In this way, the renunciation of the artificial forcing of high rates of growth not only opens up possibilities for the acceleration of scientific-technical progress but also, in turn, will be a result of this acceleration.

The growing gap between the dynamics of physical and value indicators can be seen best in the example of machine building: its commodity output is growing at an extremely rapid rate, at the same time that the output of equipment in units of productivity is not only not increasing but is even declining in absolute terms. Accordingly, the economic rates of the national economy are under the influence of the increase in prices and turnover tax and reflect the influence of the increase in reserves and incomplete construction, reducing their natural ability to be filled.

The result is a restraining of the dissemination of innovations and renewability of output and fixed capital, because equipment becomes more rather than less expensive. New equipment usually costs several times more than analogous substitutes. There is a lack of appropriate resource provision of the technical reconstruction of enterprises: the existence of financial means does not, as a rule, guarantee the possibility of acquiring the implements of labor.

For this reason, the restoration of commodity-monetary balance in the investment sphere is a necessary prerequisite for raising the receptivity of production to scientific-technical progress. Financial balance can be achieved through the normalization of investment activity and the amount and rate of growth of capital investments and through the implementation of measures aimed at limiting inflationary processes.

Technical policy must be organized taking into account the inadmissibility of the self-dissemination of inflationary processes arising in the event that a one-time impulse of higher prices evokes a snowballing increase in prices. Raw materials, for example, become more expensive under the influence of the nature factor. If it is not possible through scientific-technical progress to lower the standard expenditure of raw materials and prices for machinery are permitted to rise, then the latter, when they reach the extractive branches, will again evoke higher prices for raw materials, which will reach the processing branches and lead to a secondary price rise for machinery. And so on repeatedly. The process of lowering the purchasing power of the ruble will take place spontaneously in a closed economic profile that does not require additional impulses from outside. To block it, it may be necessary to have centralized funds for financing specific measures of scientific-technical progress that lower the specific consumption of a resource that is becoming more expensive.

It is necessary to strengthen state control over prices, bearing in mind the further gradual transfer of this function to the consumer as the market is established. In this connection, it is expedient to strengthen the anti-expenditure role of ceiling and wholesale prices for new equipment and to reflect in it the actual effect more fully. It is important to eliminate the unprofitableness of enterprises not through the unjustified raising of prices for their output but as a result of the technical reconstruction of technically backward production systems. The stimulating role of price setting must be manifested not so much in surcharges for quality as in discounts because of its low level.

One of the specific manifestations of the sharpest conflicts between productive forces and production relations is the conflict between the resource-saving nature of scientific-technical progress and the wasteful-expenditure economic mechanism. As a result of this, resource-saving technologies and high-quality and relatively inexpensive products are disadvantageous not only to the supplier but to the consumer as well. But if all participants in the production process are interested in increased outlays, then any efficient innovation that lowers them can be introduced only by coercion.

To resolve this conflict, it is necessary to shift to an anti-expenditure economic mechanism based on true cost accounting and commensurability of expenditures and results at all levels of the national economy, especially in the basic link. We note that the most important condition for the transition to a new economic mechanism is the elimination of the shortage of traditional output (a temporary shortage of new products is inevitable and is the driving motive of scientific-technical progress).

To eliminate high expenditures and shortages, it is necessary, in addition to the implementation of economic reform, to eradicate high expenditures coded into designs, projects, technologies, the equipment park, fixed capital, the educational potential and the production experience of the individual. For this reason, the elimination of the conflict between the input economic mechanism and the resource-saving nature of scientific-technical progress presupposes not only a radical reform of production relations but also the fundamental transformation of productive forces.

To raise the receptivity of the economy to scientific-technical progress, it is not enough to remove the obstacles in the way of the dissemination of innovations. This is indicated, for example, by the fact that the reduction of the overstraining of the volume indicators of production and utilization of capacities that took place in the 1970's not only did not accelerate the technical reequipment of branches but even slowed the renewal of fixed capital and output. Therefore, to raise the receptivity of production to scientific-technical progress, it is necessary not only to eliminate the anti-innovation elements in the economic mechanism (condition of necessity) but also to establish additional reasons for the application of scientific-technical achievements (condition of sufficiency).

Social and Scientific-Technical Objectives of Development: Counteraction or Interdependence

The social and scientific-technical objectives of the development of production compete with each other in the distribution of the means and resources needed for their realization. In its most general form, the conflict between them appears as a conflict between current and postponed demand. It becomes especially acute under the conditions in which the means for raising the efficiency of production through scientific-technical progress were socialized and depersonalized, at the same time that the improvement of the well-being of the members of the labor collective (in the form of payment for labor, the receipt of departmental housing and other social goods) took place primarily through state financing. This discrepancy in distribution was increased by making scientific-technical objectives autonomous and through the planning of scientific-technical progress. In such a situation in the management of production, there is a predominance of technocratism and a separation of social and economic progress from scientific-technical progress, with the latter being primary.

But the social orientation of development and the transformation of the social and consumer sector of the economy from a residual to a priority area of financing does not resolve this conflict but exacerbates it. The danger arises of the dependence of scientific-technical development upon the residual allocation of resources, which can lead the national economy to severe consequences.

To achieve a rational proportion in the distribution of means between the social and scientific-technical objectives of development, it is necessary to ensure their

interdependence in the basic link of the national economy. The interdependence is based on the cost-accounting balance relationship; under this relationship, all social goods of the labor collective (other than some guaranteed minimum) are directly proportional to the income of the enterprise, which, in turn, must depend to a decisive degree upon the dissemination of the achievements of scientific-technical progress. Under these conditions, the scientific and technical objectives are transformed from autonomous and equal objectives with respect to social aims of development to objectives that are subordinate to and serve the latter.

The conflicts and discrepancies between the social and scientific-technical objectives of development can be removed only with the elimination of imperfection in distribution relations. Among the reasons that reduce the dependence of the increase in the well-being of the collective upon the utilization of the achievements of scientific-technical progress are, for example, the significant relative share of social consumption funds, unpaid services or services with token payment. Social indifference not only to own income but also to the income of the enterprise (and therefore to scientific-technical progress as its potential source) also arises in the collective when there is no possibility of realizing it in the form of needed commodity stocks. Contributing to this is the significant relative share of supplementary wages, secondary sources of income and nonequivalent exchange between enterprises and the possibility of their obtaining superprofit.

The interest of the enterprise in an innovative resource depends upon how its price and availability relate to other forms of resources that scientific-technical progress is called upon to replace in production. Thus, the free nature of land, mineral deposits and labor resources and the lack of scientifically well-founded prices for fuel and energy diminish the interest in innovations that provide for their saving. On the other hand, low prices for studies, designs and projects as a result of the low level of payment for scientific and engineering labor help in the dissemination of innovations but hinder their creation.

High receptivity of the economy to scientific-technical progress is not feasible as long as there are large losses from poor management, the elimination of which will permit the receipt of supplemental profit with minimal expenditures and without resorting to scientific-technical achievements. In comparison with the elimination of these losses, any scientific-technical measure is usually insufficiently effective. It should be considered that the unquestionable advantages of scientific-technical progress over other types of resources (reproducibility, general replaceability and apparent availability) are really linked with great difficulties in practical application: with risk, with a temporary loss of production volume, with the necessity of raising the technological standards of production and the educational level of personnel, and with the reorganization of management structures.

Until all of these conflicts are resolved, there will inevitably be a lack of harmony between expenditures for social purposes and for new equipment: the enterprise is interested in increasing investments in the first of these directions and in so doing is prepared to reduce expenditures for new equipment as well as the scope of the dissemination of innovations. Even with progressive taxation of the means of consumption, it utilizes money remaining at its disposal to raise wages and to resolve other social tasks but not to finance scientific-technical progress.

Consequently, the state is forced to limit the independence of theenterprise in the distribution of its earned resources among the production development, social development and wage funds. In so doing, the saving of the resources in the fund for the development of production, science and technology—even if it is achieved through the better utilization of these resources—cannot be used to increase wages or for the social development of the collective.

Such a "nonconvertibility" of the earned ruble between the directions of its expenditure, being a necessary condition for the defense of the long-term development aims of the enterprise against the excessive pressure of current objectives, undermines interest in the fullest possible utilization of new equipment. Why, for example, should a labor collective under these conditions increase the interchangeability of the work of the implements of labor and seek to reduce the equipment pool, if this creates additional difficulties and does not permit the resolution of social problems? In the accumulation of adequate resources at the enterprise for its development, there is a significant lowering of demands on the supplier of new equipment and on its price and quality.

In our view, therefore, the model that has now been adopted for the functioning of the state enterprise, in which the distribution of its income among funds is regulated by standards, should be viewed as a temporary model typical of a transition period of economic reform. With the development of the reform and the elimination of the conflicts between the utilization of the achievements of scientific-technical progress and their social and economic consequences, it is essential to shift to a model in which the distribution of the enterprise's earned resources in different directions is accomplished by its labor collective. At the present time, such a model has been adopted for cooperative enterprises.

In the course of the reform, the economic mechanism for the functioning of the state enterprise must gradually approach that of cooperatives: the latter is based on a stricter and more complete model of cost accounting. In the case of the preservation of both economic mechanisms in an unchanged form for a long time, the outcome of the economic competition between cooperative and state enterprises will inevitably be predetermined in favor of the former.

These are some considerations with respect to the formation of a new mechanism for raising the receptivity of the economy to scientific-technical progress.

Goals of New USSR Nuclear Society Outlined

18140226 Moscow SOVETSKAYA ROSSIYA in Russian 16 Apr 89 p 3

[Interview with Academician N. Ponomarev-Stepnoy, first deputy director of the Institute of Atomic Energy imeni I.V. Kurchatov and a member of the organizing committee of the USSR Nuclear Society, by SOVETSKAYA ROSSIYA correspondent M. Gusev under the rubric "The USSR Nuclear Society Is Being Established": "Openly About the Atom"; first paragraph is SOVETSKAYA ROSSIYA introduction]

[Text] The constituent conference of the USSR Nuclear Society will be held tomorrow in the Hall of Columns of the House of Unions. What will this organization be like? Our correspondent M. Gusev asked Academician N. Ponomarev-Stepnoy, a member of the organizing committee and first deputy director of the Institute of Atomic Energy imeni I.V. Kurchatov, to answer this question.

N. Ponomarev-Stepnoy: This year nuclear physics has an anniversary: nuclear fission was discovered 50 years ago. The era of the development of nuclear science, technology, and power engineering began. Today it encompasses the most different strata of specialists in many countries. These are both "pure" nuclear physicists and professionals who deal with applied questions—the development of specific devices that are used in nuclear engineering, the study of the effect of nuclear energy on the environment and man, the solution of problems of the protection of the environment and man from possible adverse consequences. Of course, the question of the necessity of the contact of all these specialists is arising. Their task, which is common to all mankind, is to understand as best as possible the problem as a whole, finding integrating, general solutions. The need to increase protective measures, even to the detriment of power indicators, or to intensify research immediately in some area is arising. And there is no time for all the consultations from the bottom to the top, with which the flesh of departmental organizations is permeated.

The new nuclear society is a nongovernmental organization. I hope that the society will bring the freedom of opinions and the interrelations among scientists, engineers, and designers to a higher level of freedom.

Our sector and the sources of power, with which we deal, are potentially dangerous. The lack of culture and the ignorance of people also are. Therefore, the task of the society being established is to raise the overall level of knowledge in this area, so that people themselves could judge what is happening in a qualified and responsible manner. The Nuclear Society does not intend to proclaim the slogan: "A Green Light for Atomic Energy." We are for the intelligent decision of people, who have the right to honest information. They will also be able to obtain it in the society: on any questions of nuclear power engineering and on the radiation situation.

Unfortunately, the Nuclear Society is being established in our country as one of the last among the countries that are studying nuclear problems in earnest. The experience of the most mature analog—the American Nuclear Society—confirms its unconditional benefit for everyone.

The organizing committee sent appeals to 145 organizations and enterprises, which are busy in the area of nuclear research and the use of nuclear energy in the national economy and related areas of activity. Thus, everything happening in the various directions of the use of nuclear energy will become accessible to the public, moreover, in language that is comprehensible to everyone. This is very important today, people are justly attempting to place under their control all the sectors of the national economy, especially those that influence the ecological situation in the country.

Geologists Form All-Union Society

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[Article: "Resolution of the Constituent Conference of the All-Union Scientific and Technical Geological Society"]

[Text] 1. The congress passed a resolution to create the All-Union Scientific and Technical Geological Society as a public organization, operating on the basis of the approved Statutes.

2. The Congress notes that the creation of the All-Union Scientific and Technical Geological Society opens new opportunities to increase the creative activeness of scientists, engineering and technical workers, production innovators, and enthusiasts of scientific and technical progress in developing geological, geophysical, and geochemical science and prospecting technology, through the geological study of the earth's interior and by expanding and strengthening the country's mineral and raw material base, and enables the consolidation of efforts by the representatives of geological enterprises and organizations of various departments and sectors of the national economy, as well as of the associates of USSR Academy of Science institutes, the teachers and students of geological prospecting and mining VUZs [Higher Educational Institution] and tekhnikums of university geological departments, and of other VUZs on a more democratic basis, on the principles of self-management and self-financing.

The society's most important task is to involve the entire scientific, engineering and technical community in implementing the resolutions of the 27th CPSU Congress and the 19th All-Union Party Conference on converting the national economy to an intensive path of development and restructuring all areas of social life. The society's members should actively participate in solving the specific problems of science, engineering, and industry, act as partners and opponents for economic agencies, shape public opinion on the problems of developing the geological prospecting industry and preserving the surrounding environment, ensure glasnost and broad democracy, scientific principle-mindness, and an alternative approach in seeking constructive solutions, and should teach high responsibility for the progress of domestic science and engineering and impatience toward conservatism and stagnation.

3. The congress believes that the society's activity should focus on accelerating scientific and technical progress in geology and on the technical re-tooling of the geological prospecting industry as a basis for raising the pace and efficiency of the economy. For these purposes, it is necessary very persistently to solve problems, related to the developing and implementing the State Mineral and Raw Material Program, to developing the raw material base of existing extraction enterprises, to preparing new, powerful raw material bases with deposits of suitable scale and quality in economically favorable regions, and to raising the geological and economic efficiency of geological prospecting work.

Particular attention should be devoted to participating in improving the new economic mechanism and to assisting geological organizations and enterprises in applying cost-accounting and self-financing.

It is the society's direct responsibility to take a most active part in intensification of the geological prospecting industry on the basis of the extensive application of the achievements of scientific and technical progress, and of the development and increase in the level of scientific research, particularly research which decisively affects the improvement of the forecasting, methodology, and procedures for seeking out, prospecting, and economically evaluating deposits of useful minerals, and the improvement of technical re-tooling and resource conservation.

Special attention should be devoted to developing the "Geos" Intersectorial Scientific and Technical Complex, and to creating the Geosystem—a fundamentally new stage in developing and mastering the country's mineral and raw material resources.

4. The congress directs the society toward creating favorable conditions for developing initiative and for the fullest manifestation of the creative abilities of scientists, engineers, specialists and workers. The society should:

- Provide every enthusiast of scientific and technical progress with assistance and support in developing and implementing his proposals, and should become an attractive environment for profession interaction and the appearance and competition of new ideas;
- Paramount significance should be given to seeking out, selecting and analyzing promising ideas and proposals advanced by the scientific and technical community, organizing meaningful discussion of them by specialists, and controlling implementation. Public methods for offering assistance should be developed and the conduct of public expert analysis of plans to develop geological prospecting work, of technologies being created, and of equipment for geologists, should be practiced;
- Should persistently assert an atmosphere of competitiveness, stimulate the search for the most effective scientific and engineering solutions, and should expand the practice of conducting goal-oriented competitions, auctions of ideas, and markets for scientific and technical achievements;
- Should create temporary creative collectives and centers for scientific and technical services, operating on cost-accounting principles, and should form them on a competitive basis.

The practice of organizing courses, seminars, schools for leading experience, and people's universities should be expanded, and lecture groups of highly-skilled scientists and specialists should be created.

5. The congress considers it necessary to constantly develop and improve international ties, to improve the coordination of joint work with the scientific and technical organizations of the socialist countries in implementing the Comprehensive Program for the Scientific and Technical Progress of CEMA-Member Countries, and to more fully utilize the possibilities for participating in the activity of international engineering organizations.

6. The congress notes the need to elevate the role of primary organizations in implementing the rights of labor collectives, according to the USSR Law on State Enterprises (Associations), in solving the problems of the technical renovation of the geological prospecting industry, of applying the achievements of science and engineering and advanced experience, and of creating an atmosphere of true creative exploration within them.

The congress directs the board of the All-Union Scientific and Technical Geological Society:

— to display constant concern for the development of democratic principles in work, to raise the role, responsibility and independence of the society's organizations, to not tolerate petty supervision of them, and constantly assist them;

— to improve the style of work, not tolerate bureaucratism, formalism, and red tape, and to display objectivity and a self-critical attitude in evaluating the results of their own activity;

— to systematically inform the scientific and technical community about the board's activity, the fulfillment of the decisions being made, and critical observations and proposals;

— to ensure the further intensification and expansion of ties with soviet, trade union, state and economic organizations. Cooperation with the Komsomol organization in developing the scientific and technical creativity of youth must be improved. Scientific, methodological and consultation assistance should be given to youth creative collectives, and students and teachers of higher and secondary geological-type educational institutions should be involved extensively in the society's activity;

— to turn to the USSR Union of Scientific and Engineering Societies with a request to accept the All-Union Technical and Geological Society as a member of the USSR Union MIO and to register the Statutes of the VNTGeO.

8. The congress instructs the republic and territorial initiative groups to hold organizational meetings to create republic, territorial and primary VNTGeO organizations before 1 February 1989.

Staff of the VNTGeO Elective Bodies: Central Board

Aliyev, Khamrakim Shukurovich—deputy chairmen, Uzbek republic board; **Alimbekov, Boris, Davydovich**—chief engineer, deputy general director, "Yuzhgeologiya" Production Geological Association, chairman, Volga-Don territorial board, candidate of technical sciences, honored geologist of the RSFSR; **Afanasyev, Ivan Stefanovich**—VITR director, deputy chairman, Northwest territorial board, candidate of technical sciences; **Bakulin, Yuriy Ilich**—DVIMS director, candidate of geomineral sciences; **Barsuk, Yevgeniy Lvovich**—chief engineer, "Turkmengeologiya" PO, chairman, Turkmen republic board; **Bgatov, Vasiliy Ivanovich**—deputy general director, SNIIGGiMS, chairman, West Siberian territorial board, doctor of geomineral sciences, professor, honored geologist of the RSFSR; **Bekzhanov, Ginayat Rakhmetullich**—general director "Kazrudgeologiya" NPO, candidate of geomineral sciences; **Berdyayev, Dmitriy Nikolayevich**—chief engineer, deputy director, "Polyarnouralgeologiya" Industrial Geological Association; **Bogino, Vladimir Antonovich**—deputy general director, "Belorusgeologiya" PO, chairman, Belorussian republic board, candidate of geomineral sciences, winner of the BSSR State Prize; **Vetrennikov, Vladimir Vasilyevich**—chief geologist and deputy general director, "Latvgeologiya" PO, chairman, Latvian republic board, candidate of geomineral sciences; **Vorobyev, Vadim Ivanovich**—deputy chief, Main Scientific and Technical Administration, and USSR Mingeo department chief.